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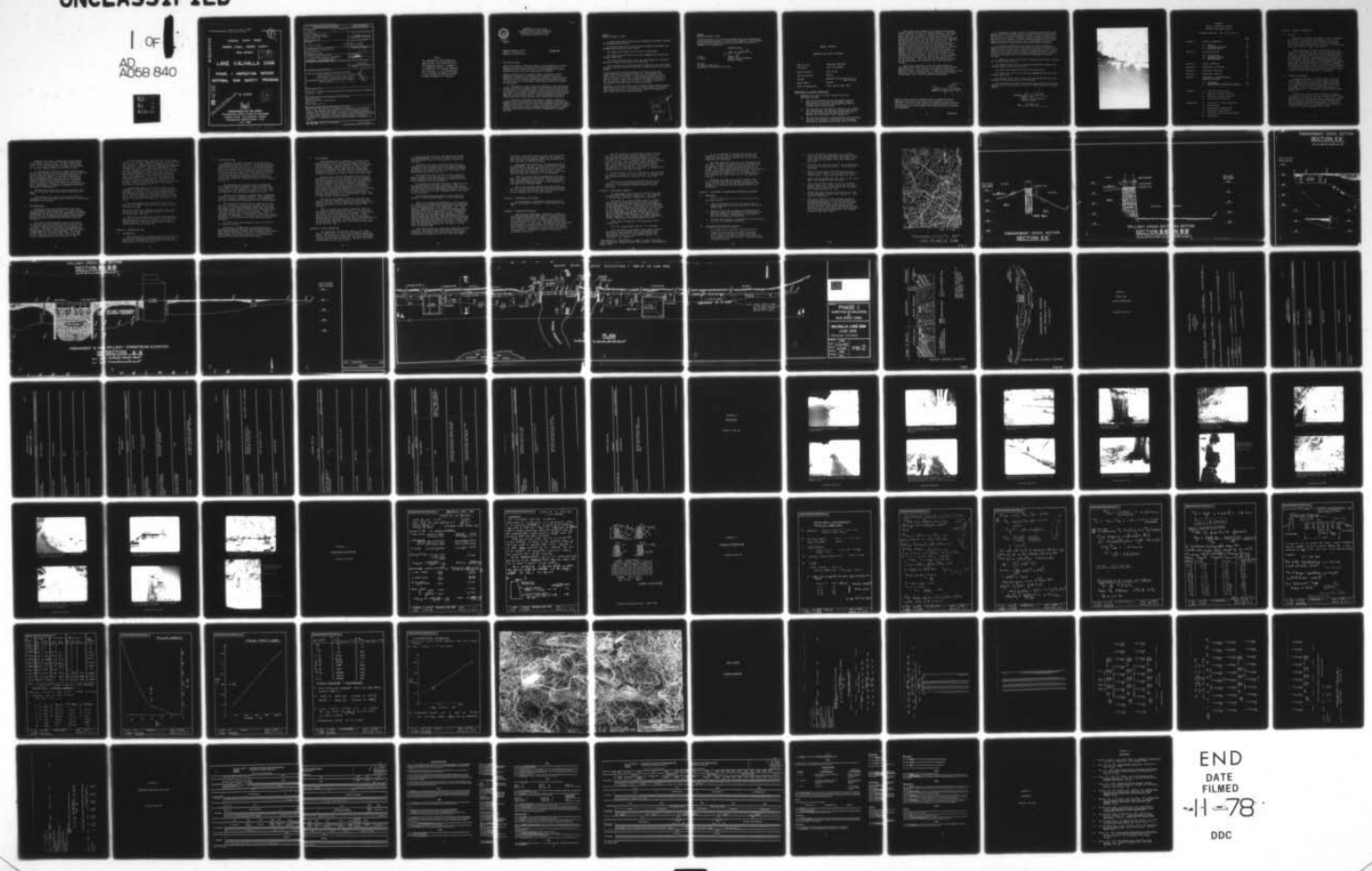

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PASSAIC RIVER BASIN

MORRIS CANAL, MORRIS COUNTY

NEW JERSEY

LEVEL II

LAKE VALHALLA DAM

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NJ 00330

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

CUSTOM HOUSE - 2D & CHESTNUT STREETS

PHILADELPHIA, PENNSYLVANIA 19106

JULY 1978

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Morris County, N.J

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Lake Valhalla Dam, N.J.

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This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-D

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

25 AUG 1978

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Lake Valhalla Dam in Morris County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given on the first three pages of the report.

Based on visual inspection, available records, calculations and past operational performance, Lake Valhalla Dam is judged to be in fair condition. However, the dam's spillway is considered seriously inadequate as 17 percent of the Probable Maximum Flood (PMF) would overtop the dam. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by more sophisticated methods, procedures and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1979. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. Engineering investigations and studies to better ascertain the stability of the dam and spillway with respect to seepage, overturning and sliding should be completed by the owner within nine months from the date of approval of this report. Borings, probes and piezometers should be utilized as part of these investigations. Remedial measures, indicated as a result of these investigations and studies, should be implemented in calendar year 1979.

c. Within four months from the date of approval of this report, complete the following remedial actions:

(1) Repair eroded areas of the upstream and downstream embankment and provide protection against future erosion.

(2) Repair and strengthen the side walls of the spillway.

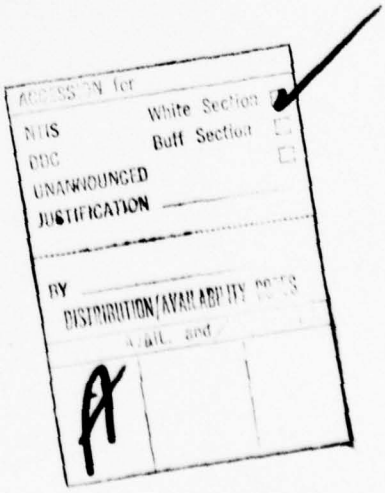
(3) Remove trees and brush from the dam's embankment and replace with suitable ground cover.

(4) Prevent floating debris, boats, etc. from plugging the free space between the footbridge and the top of the spillway.

(5) The outlet pipe should be located and checked and the outlet valves repaired so the lake level may be drawn down to make repairs or for emergency purposes.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congresswoman Millicent Fenwick of the Fifth District. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, thirty days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia, 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.



NAPEN-D
Honorable Brendan T. Byrne

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely yours,

James G. Ton

1 Incl
As stated

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

Cy furn:
Mr. Dirk C. Hofman, P.E.
Department of Environmental Protection

PHASE 1 REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam:	VALHALLA LAKE DAM
ID Number	Fed. ID NJ00330
State Located:	New Jersey
County Located:	Morris
Stream:	Unnamed Stream Tributary to Morris Canal
River Basin:	Passaic
Date of Inspection:	7,15, and 19 June 1978

ASSESSMENT OF GENERAL CONDITIONS

Valhalla Lake Dam is in fair condition for the following reasons:

1. Lack of maintenance of the structures such as the erosion of the downstream slope, vegatal growth in the spillway side walls, and lack of a functional bottom outlet:

2. The stability of the dam and spillway with respect to underseepage, overturning, and sliding cannot be reliably evaluated because of the lack of design and construction and information;

3. The spillway capacity as determined by CE screening criteria is seriously inadequate. We estimate the dam can adequately pass only 16% of the PMF.

The outlet pipe should be located and the outlet valves repaired so that the outlet system is functional. It is urgent to be able to control and lower the lake water level when necessary. Piezometers should be installed upstream of the spillway, and in the upstream and downstream slopes at the cross section corresponding to the marshy areas, and, in the marshy areas. If necessary, relief wells should be installed and their locations determined by means of borings and probes and the results obtained from the piezometers. Erosion damage should be repaired and protection provided against future erosion of the upstream and downstream slopes. The side walls of the spillway should be repaired and strengthened. Provisions should be made to prevent floating debris, boats, etc., from plugging the free space between the foot bridge and the top of the spillway. Trees located on and within the area of the embankment and spillway side walls should be removed.

The actual capacity of the spillway should be determined using more precise and sophisticated methods and procedures. The need for the type of mitigating measures should be determined. Around the clock surveillance during periods of unusually heavy precipitation should be provided, and a warning system established.

Dennis J. Leary

Dennis J. Leary, P.E.

Based on visual inspection, available records, calculations and past operational performance, Lake Valhalla Dam is judged to be in fair condition. However, the dam's spillway is considered seriously inadequate as 17 percent of the Probable Maximum Flood (PMF) would overtop the dam. To insure adequacy of the structure, the following actions, as a minimum, are recommended:

(Continued)

a. The spillway's adequacy should be determined by more sophisticated methods, procedures and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping, should be initiated within calendar year 1979. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

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c. Within four months from the date of approval of this report, complete the following remedial actions:

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(3) Remove trees and brush from the dam's embankment and replace with suitable ground cover.

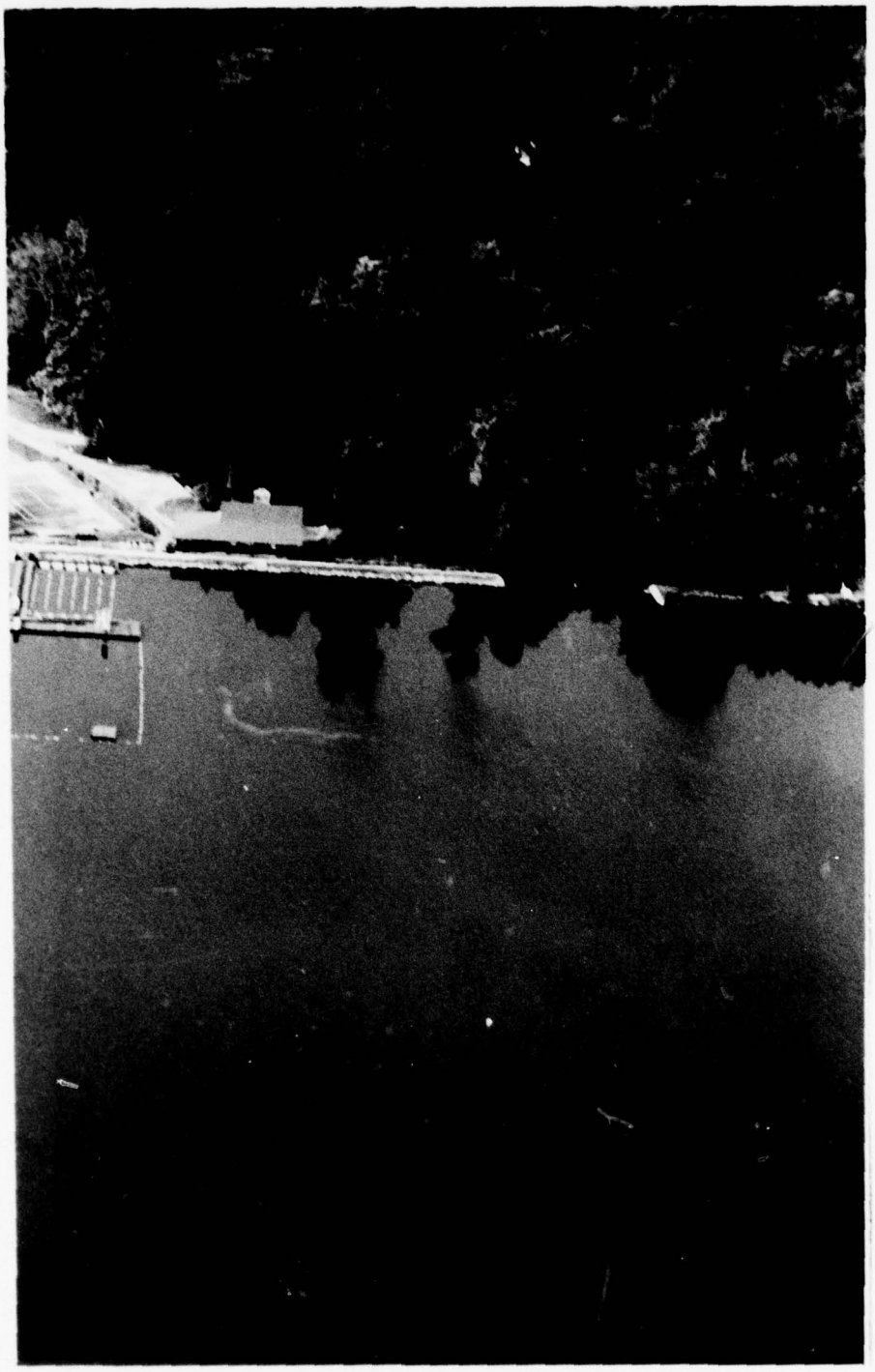
(4) Prevent floating debris, boats, etc. from plugging the free space between the footbridge and the top of the spillway.

(5) The outlet pipe should be located and checked and the outlet valves repaired so the lake level may be drawn down to make repairs or for emergency purposes.

APPROVED: James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 25 Aug 78



OVER VIEW

VALHALLA LAKE DAM

21 June 1978

CONTENTS

PHASE 1 INSPECTION REPORT

NATIONAL DAM SAFETY REPORT

VALHALLA LAKE DAM FED ID NO. NJ00330

SECTION 1 PROJECT INFORMATION

1.1 General

Authority to perform the Phase I safety inspection of Valhalla Lake Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 26 May 1978. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367.

The purpose of the Phase I investigation is to develop an assessment of the general conditions with respect to safety of Valhalla Lake Dam and appurtenances based upon available data and visual inspection and, determine any need for emergency measures and conclude if additional studies, investigations and analyses are necessary and warranted. The assessment has been made using screening criteria established in Recommended Guidelines for Safety Inspection of Dams prepared by the Department of Army, Office of the Chief of Engineers. It is not the purpose of the inspection to imply that a dam meeting or failing to meet the screening criteria is, per se, certainly adequate or inadequate.

1.2 Project Description

Valhalla Lake Dam is a 620-ft-long, 18-ft-high earth embankment with a 3-ft-wide masonry core and a 78-ft-long, 17-ft-high freefall masonry spillway. It is reported to have been constructed in 1930 and is located at 40° 55' 40" latitude and 74° 22' 36" longitude, at the southern end of Lake Valhalla in Morris County, N.J. A regional vicinity map is given in Fig. 1.

The dam has an outlet structure with a manual valve that is not in use and is reported to have been intended for drawdown of the lake. The valve is rusted and could not be turned and the discharge pipe could not be located. Maintanence personnel did not know where discharge pipe was located and our inspection of the downstream are of the dam did not disclose its location. It may be plugged and covered.

Valhalla Lake Dam is classified as being small on the basis of its reservoir storage volume, which is less than 1,000-acre feet, but more than 50-acre feet. It is also classified as "Small" on the basis of its total height, which is less than 25 feet.

In the National Inventory of Dams, Valhalla Lake Dam has been classified as having "High Hazard Potential" on the basis that failure of the dam would cause excessive property damage to resisdences downstream, and could potentially cause more than a few deaths. Visual inspection of the downstream area shows that breach of the dam would cause damage to residences and be hazardous to people utilizing a low lying picnic area. Accordingly, no change is proposed concerning the Hazard Classification.

The dam and reservoir are owned by Valhalla Lake Club, P.O. Box 586, Lake Shore Drive, Montville, N.J. 07045.

The purpose of the dam is recreation and no information is available concerning its design, construction, maintenance or operation.

1.3 Pertinent Data

Elevations have been established on the basis of USGS Pompton Plains Quadrangle, 7.5 Minute Series, topographic maps and an arbitrary approximate benchmark. Measurements at the dam site were made using surveyors transit and rod, and should be considered approximate. Essential project features and elevations are given in Fig. 2.

The Valhalla Lake drainage area is 1500 acres. The drainage area is in general long and narrow with a length of approximately 3 miles and a width of 1/2 to 1 mile. The area is essentially undeveloped and wooded with scattered single family residential houses in approximately 10% of the watershed. The ground surface slope is in general about 10% but as steep as 25%. The lake area is 85 acres and at the time of our inspection the lake level was at el 398.

The top of the dam is at el 401 and the spillway crest is at el 397.9. The central 18 ft of the spillway crest is 0.6 ft lower than the remaining portion of the spillway. Tailwater was at el 383 and the discharge channel is at el 382.2. The left embankment is 350-ft-long and varies in downstream height from zero at the left abutment beach area to 16 ft at the spillway. The right embankment is 190-ft long and varies in downstream height from zero at the right abutment to 15 ft at the spillway. The 3-ft-thick core in the embankment appears to be vertical. The downstream side of the core is unsupported for a height of 10 ft and a length of 40 ft at the location of a one story building along the right embankment. The width of the crest of the dam is 6 ft.

Downstream slopes vary from horizontal at the abutments to essentially 1.5 hor to 1 vert near the spillway to 1 hor to 1 vert at the spillway abutments. The downstream slopes are grass covered with small trees. The free board is 3 ft and the upstream slope below lake level appears to be about 20 hor to 1 vert. There is upstream rip-rap about one foot below crest level.

The core appears to be impervious and no information is available concerning the presence of a cut-off below the dam.

The outlet valves are located in a valve house 20 ft upstream of the right spillway abutment at the end of the spillway side wall.

The bed of the downstream channel has boulders that vary in size from 1 ft to 8 ft. A one foot high masonry walk way crosses the channel about 300 ft downstream and a light vehicular bridge crosses the channel about 400 ft downstream.

SECTION 2 ENGINEERING DATA

2.1 Introduction

No information is available concerning the design, construction, operation and maintenance of the dam. We have been informed that the outlet valves have not been used for at least ten years.

2.2 Regional Geology

Valhalla Lake Dam is located in the New Jersey Highlands physiographic province. The New Jersey Highlands extend across the state in a northeast-southwest direction from the border of New York to the Delaware River and includes the northwest portions of Hunterdon, Passaic and Morris Counties and the southeastern parts of Warren and Sussex Counties. This province is part of the New England Physiographic Province and lies between the Appalacian Ridge and Valley Province to the northwest and the Piedmont Province to the southeast. See Fig. 3.

The Highlands are characterized by rounded and flat-topped northeast-southwest ridges and mountains up to 1,40C ft high separated by narrow valleys. The orientation of the valleys are usually, but not always controlled by the underlying geologic structure.

Bedrock of the region is predominently Precambrian gneisses, schists, and metasediments. Some sedimentary strata, typically sandstones, shales and conglomenate have been infolded and infaulted into the valley bottoms.

The regional geologic structure reflects the very old age of bedrock. A number of regional faults cross the area in a northeast southwest direction, including the Ramapo Fault; the more than 30 mile long fault scarp forms the eastern border of the province. Faults control many of the river valley orientations. The relatively uniform slope of the mountain elevations, from northwest to southeast, is a direct result of the faulting. The entire area is part of the now dissected Schooley Peneplain.

The Pleistocene Age Wisconsin glacier covered all of the dam site area.

The glacier stripped most of the existing overburden and weathered rock and uncovered the numerous hard bedrock knobs and ridges seen throughout the province. Most of the side-slopes in the area are covered with heavy boulder tills (ground moraine), and glacial outwash and recent alluvium cover the valleys.

2.3 Site Geology

Lake Valhalla Dam is located in a valley between Turkey Mountain and a southeast extension ridge of Waughaw Mountain, near the eastern boundary of the New Jersey Highlands. Waughaw Mountain is the up thrown side of the Ramapo Fault and forms the fault scarp between the Highlands and the adjacent Piedmont Physiographic Province. The lake lies at about elevation 400 with the mountains rising to 800 ft on either side.

Examination of aerial photographs and an on-site inspection of the dam site indicates that the dam has been constructed on relatively deep, heavily bouldered, glacial ground moraine and, depending on the depth of the dam foundation, possibly on glacial outwash or recent alluvium. Stratified alluvium stream deposits occupy the stream bottom downstream of the spillway and includes well rounded boulders up to 8 ft in diameter. No evidence of bedrock was seen at either abutment. However, the steepness of the slopes suggest that relatively shallow bedrock, ie. less than 20 ft deep, could be found further up the abutment.

The overall topography in the dam site area indicates relatively pervious zones of overburden could underlie the dam. This is supported by the swampy areas located downstream of the dam on both sides of the spillway.

There are unverified reports that water wells in the ara have encountered more than 50 ft of sand above the bedrock and the valley was occupied by a much smaller lake prior to the construction of the dam. A good quality gneissic rock reportedly from a large quarry located east of the lake, has been used in the construction of the vertical spillway. No deterioration of the rock was noted, but, some erosion of the mortar between rock blocks could be seen.

SECTION 3 VISUAL INSPECTION

The embankment and spillway appear to be stable with no indications of failure of the dam and appurtanances. The masonry core wall appears intact and without vertical or horizontal deflection. The earth embankment on both sides of the core wall has settled one to three inches below the top of the wall.

There are small trees in the upstream and downstream embankment. The roots of these trees could cause piping problems if they penetrate through the core wall.

Erosion of the earth upstream of the wall has occured at three locations along the right embankment to depths of one to three feet. In addition, erosion has occured to a depth of one to four feet below the downstream side of the core wall.

The downstream vertical face of the spillway is made of masonry stone and appears in good condition. Minor seepage is occuring through the downstream face of the spillway near the abutments.

The downstream abutment side walls slope away from the spillway and are in poor condition. They act as retaining walls for the downstream backfilling behind the core wall and there are signs of movement and erosion by rain in that part of the embankment where the height is the greatest.

The upstream rip-rap appears in good condition except in a few locations where it has disappeared.

There is no downstream embankment at the location of a one story building constructed directly downstream of the core wall in the right embankment. The ground level is approximately 10 ft. below the crest. The building itself is not in a good state of maintenance. Portions of the wall perpendicular to and immediately downstream of the core wall are cracked. It appears the core wall and the downstream embankment are on stable foundation material. Whereas further downstream the building walls are supported on the existing ground and have suffered differential settlement. Within the building the inside face of the core wall is perfectly dry. No seepage was observed at the wall or on the floor of the building.

The outlet valves are rusted and could not be moved manually. The outlet pipe could not be located and no one at the Valhalla Club could provide information concerning its location or the last time the valves

were used. The outlet gate could be seen below water from the valve house and it appears to be rusting. This outlet valve system may have been abandoned many years ago and is possibly plugged.

No leakage was observed at the downstream toe of the embankment. However, further downstream, on both banks of the stream and approximately 1 to 2 ft above downstream water level there are wet marshy areas. The water may come from the slope itself, or more probably through the foundation of the embankment.

There are two structures downstream of the core wall. One immediately downstream and the other about four feet downstream of the wall. These structures offer minimal downstream support of the embankment in the event of an extreme flood.

Two of the spillway concrete capstone slabs are missing and the concrete has deteriorated and broken up. It appears that at one time the full 78 ft width of the spillway was at the same elevation.

SECTION 4 OPERATIONAL PROCEDURES

No information is available concerning past or present operational procedures or maintenance of the dam.

SECTION 5 HYDRAULIC/HYDROLOGIC

The hydraulic/hydrologic evaluation is based on a spillway design flood (SDF) equal to one half to the full probable maximum flood (PMF) in accordance with the evaluation guidelines for dams classified as high hazard and small in size. The hydrologic design data for this dam is not available. The PMF has been determined by developing a synthetic hydrograph based on the maximum probable precipitation of 22.5 inches (200 square mile - 24 hour). Hydrologic computations are presented in Appendix 4. The PMF determined for the subject watershed is 6652 cfs.

The main spillway is essentially a broad crested weir with an effective length of approximately 65 ft and a maximum flow depth of approximately two feet although the distance from the spillway crest to dam crest is 3.0 ft. This is because a foot bridge traverses over the spillway and wood beams impede the outlet flow. The spillway is divided into 6 area ways by the supports for the walkway. The capacity of the spillway to the underside of the walkway is approximately 680 cfs which is less than the SDF.

Flood routing for both the PMF and 1/2 PMF indicates the dam will overtop, by 2.6 ft and 1.4 ft respectively. We estimate the dam can adequately pass 16% of the PMF.

There is no specific information available with regard to the size and function of the outlet pipe. Therefore, a preliminary drawdown analyses has not been made.

SECTION 6 STRUCTURAL STABILITY

The embankment and spillway do not show any sign of instability from visual inspection. The stability of the spillway side walls appears to be marginal.

The stability of the spillway itself is unknown since there is no available information concerning the upstream slope of the masonry, and watertightness of the upstream backfill. An analysis of the stability of the spillway section has been made for a water level of 3 ft above the crest of the spillway (crest level of the embankment), an assumed slope of 1 hor to 2.5 vert for the upstream face of the spillway, and no uplift pressure inside the wall (i.e. impervious upstream backfill). For sliding the masonry/foundation friction coefficient has been assumed to be 0.8.

Under these assumptions, the Calculated safety factors are:

FS = 1.8 (overturning) and FS = 1.5 (sliding)

It is of interest to compare these safety factors with those given by Healy* for a rectangular wall, but with no indication of the height of water over the spillway. FS = 1.4 (overturning) and FS = 1.3 (sliding). See Appendix 3.

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* Ref: Healy K.A. "Evaluation of repair of stone wall-Earth dams; Proceedings, Safety of small dams, Hennifer, New Hampshire, August 1974.

It is not possible to decide from visual site inspection, if the assumed conditions used in the stability computations, or another set of equivalent conditions are fulfilled.

The same limitations apply to the embankment and core wall. Nothing is known concerning the core wall, its upstream slope, foundation level and quality of foundation or the existence and effectiveness of a cutoff. The quality and characteristics of the foundation of the downstream backfill are also unknown. This makes any sort of computation for the embankment even more hypothetical than in the case of the spillway section.

Valhalla Lake Dam is located in Seismic Zone 1 of the Seismic Zone Map of Contiguous States. The degree of stability of the dam and appurtenances are assumed to be marginal and may present hazard from earthquakes.

SECTION 7 ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Assessment

Valhalla Lake Dam is in fair condition for the following reasons:

1. Lack of maintenance of the structures such as downstream slope, spillway side walls, and bottom outlet; and

2. Because of the lack of design and construction data the degree of stability of the dam and spillway with respect to underseepage, overturning, and sliding cannot be determined.

3. The spillway capacity as determined by CE screening criteria is seriously inadequate.

7.2 Recommendations/Remedial Measures

We recommend the following remedial measures:

1. Locate the outlet pipe and repair the outlet valves so that the outlet system functional. It is urgent to be able to control and lower the lake water level when necessary. This work should be done very soon.

2. Install Piezometers upstream of the spillway, and in the upstream and downstream slopes at the cross section corresponding to the marshy areas, and in the marshy areas. This work should be done soon.

3. Determine the upstream slope of the spillway wall by means of borings and probes. This should be done soon.

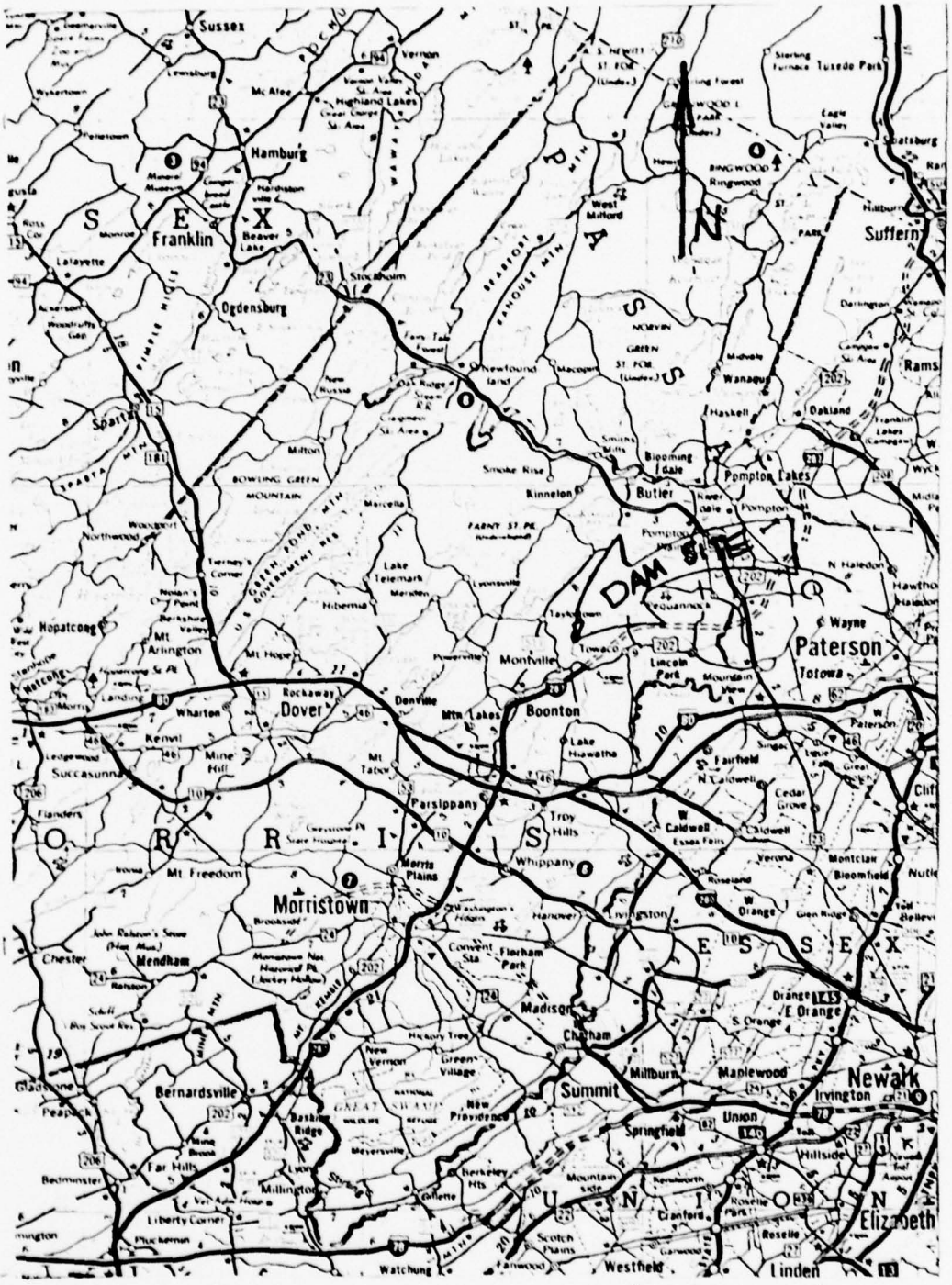
4. Repair erosion damage and provide protection against future erosion of the upstream and downstream slopes. This should be done very soon.

5. Repair and strengthen the side walls of the spillway. This should be done very soon.

6. Provisions should be made to prevent floating debris, boats, etc. from plugging the free space between the bridge and the top of the spillway. This should be done very soon.

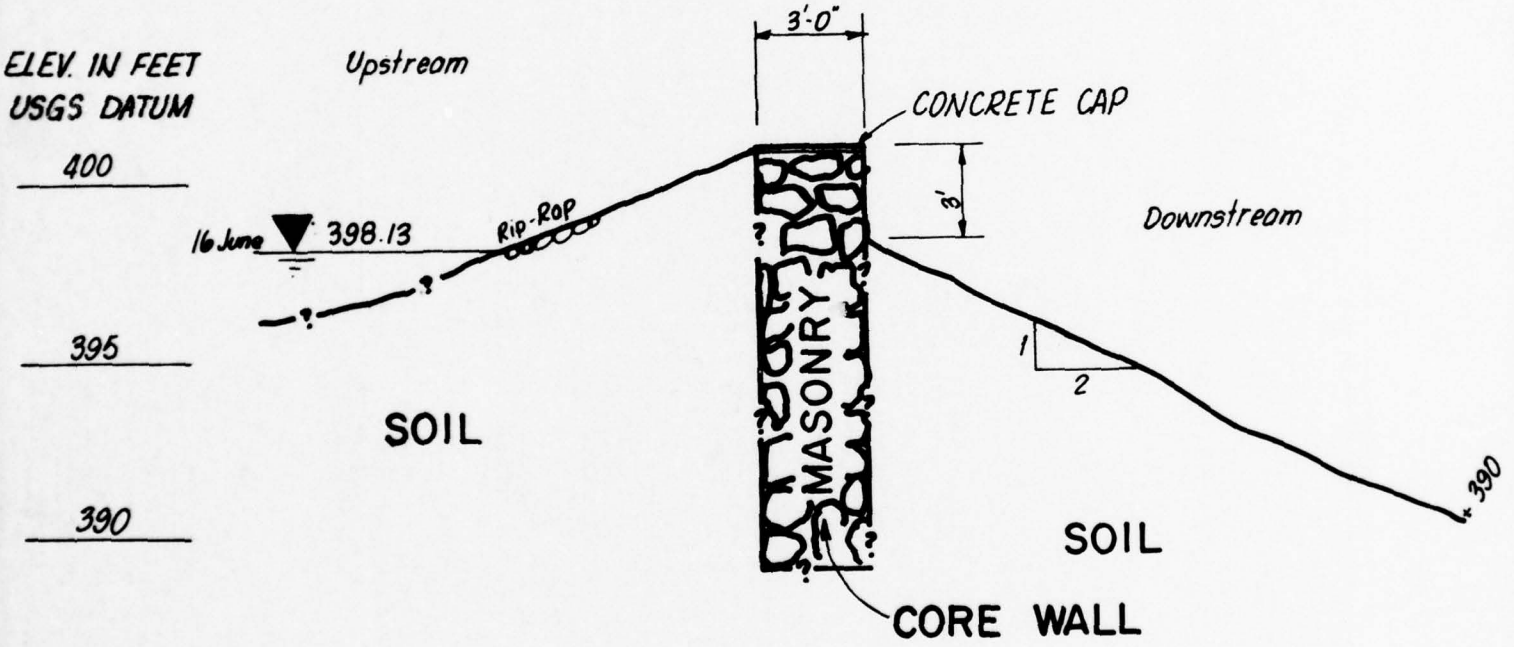
7. Remove any trees located on and within the area of the embankment and spillway side walls. This should be done soon.

8. The actual capacity of the spillway should be determined using more precise and sophisticated methods and procedures. The need for and type of mitigating measures should be determined. Around the clock surveillance during periods of unusually heavy precipitation should be provided, and a warning system established. This should be done in the near future.



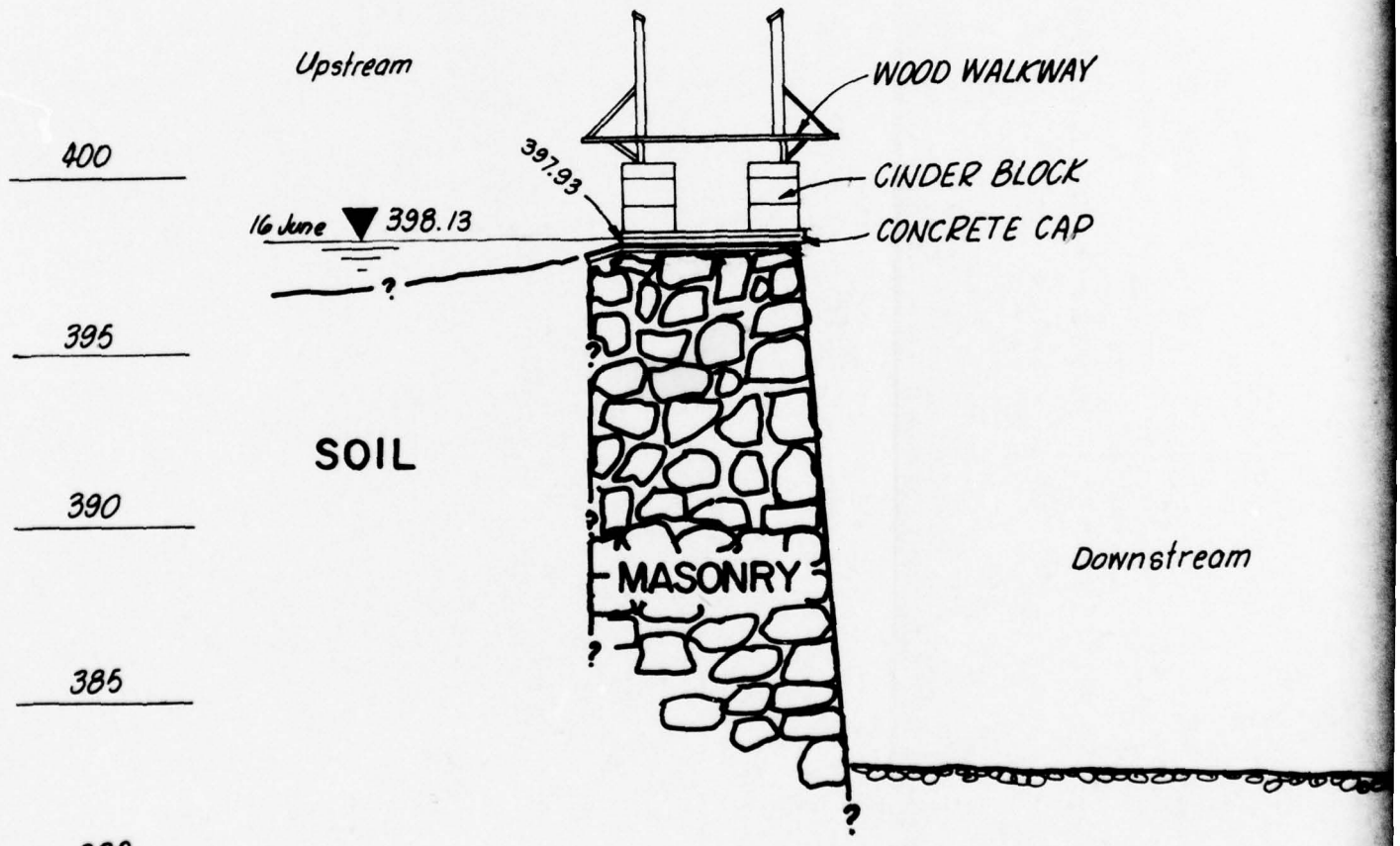
REGIONAL VICINITY MAP
LAKE VALHALLA DAM

Fig. 1



EMBANKMENT - CROSS SECTION

SECTION C-C'



SPILLWAY - CROSS SECTI

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ELEV. IN FEET
USGS DATUM

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SS SECTION

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380

EMBANKMENT - CROSS SECTION

SECTION C-C'

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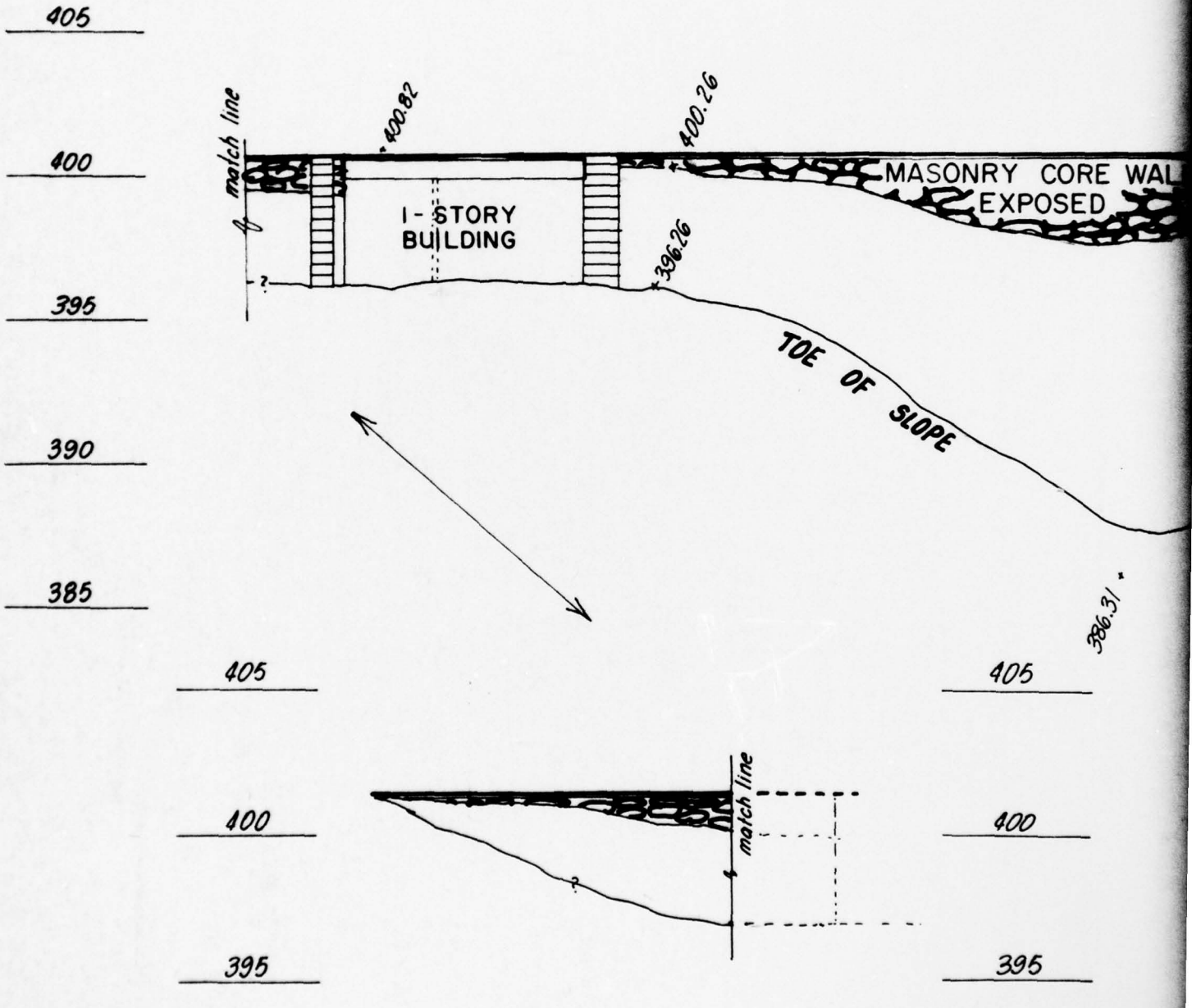
ELEV. IN FEET
USGS DATUM



SPILLWAY - CROSS S

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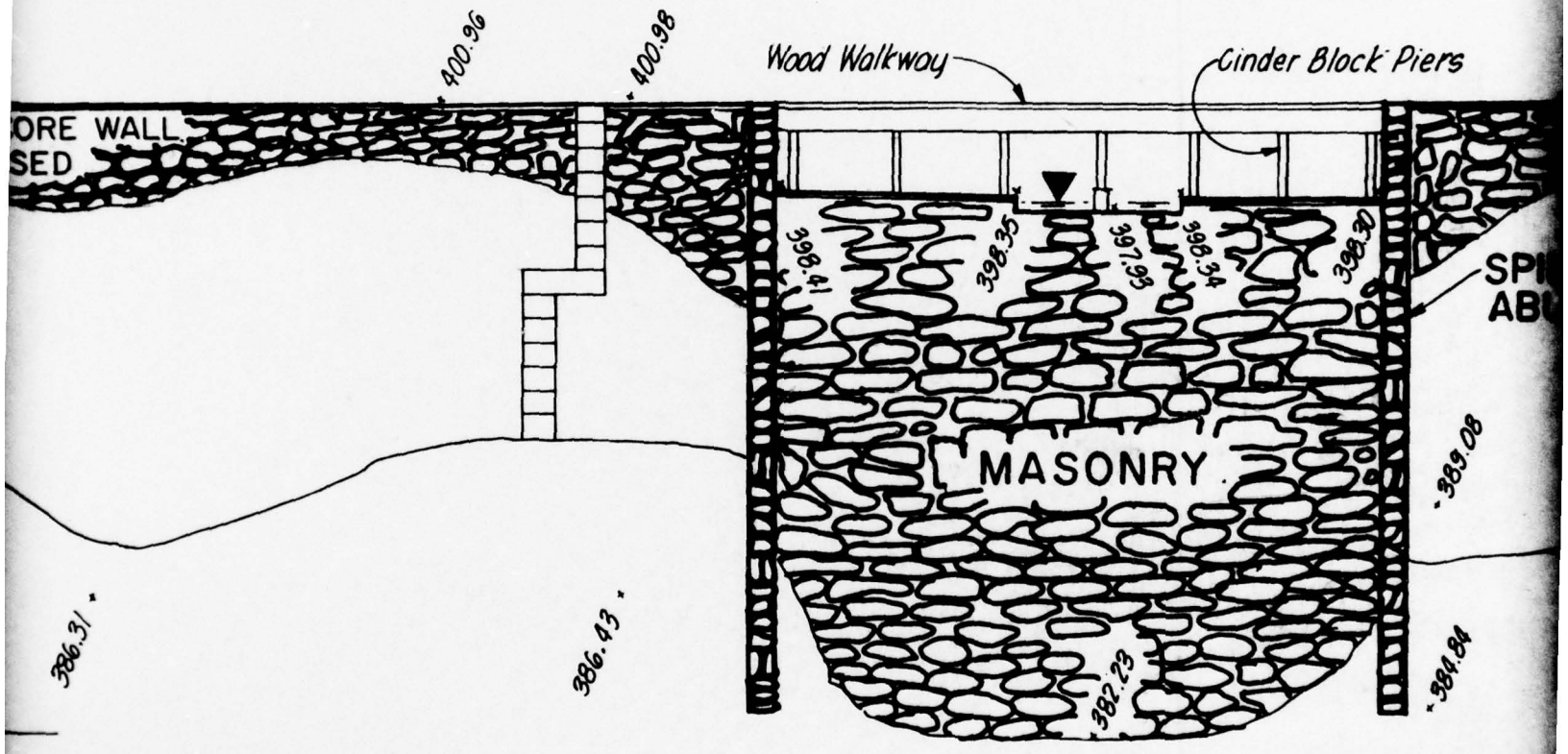

EMBANKMENT & SP

SE

Horiz 0

Vert 0

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LAKE

S SECTION

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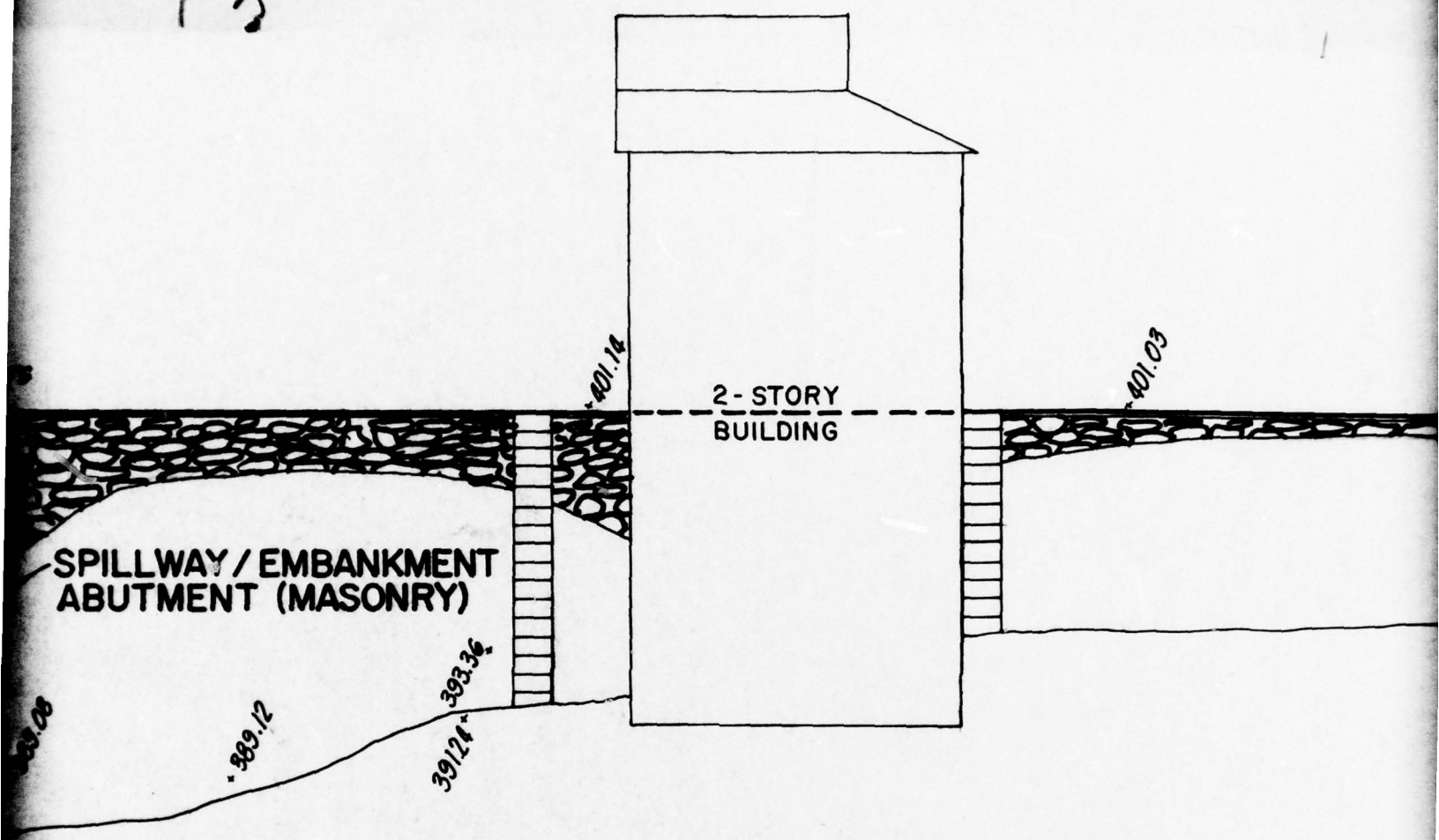
10 16 ft

1 3



SPILLWAY - DOWNSTREAM ELEVATION

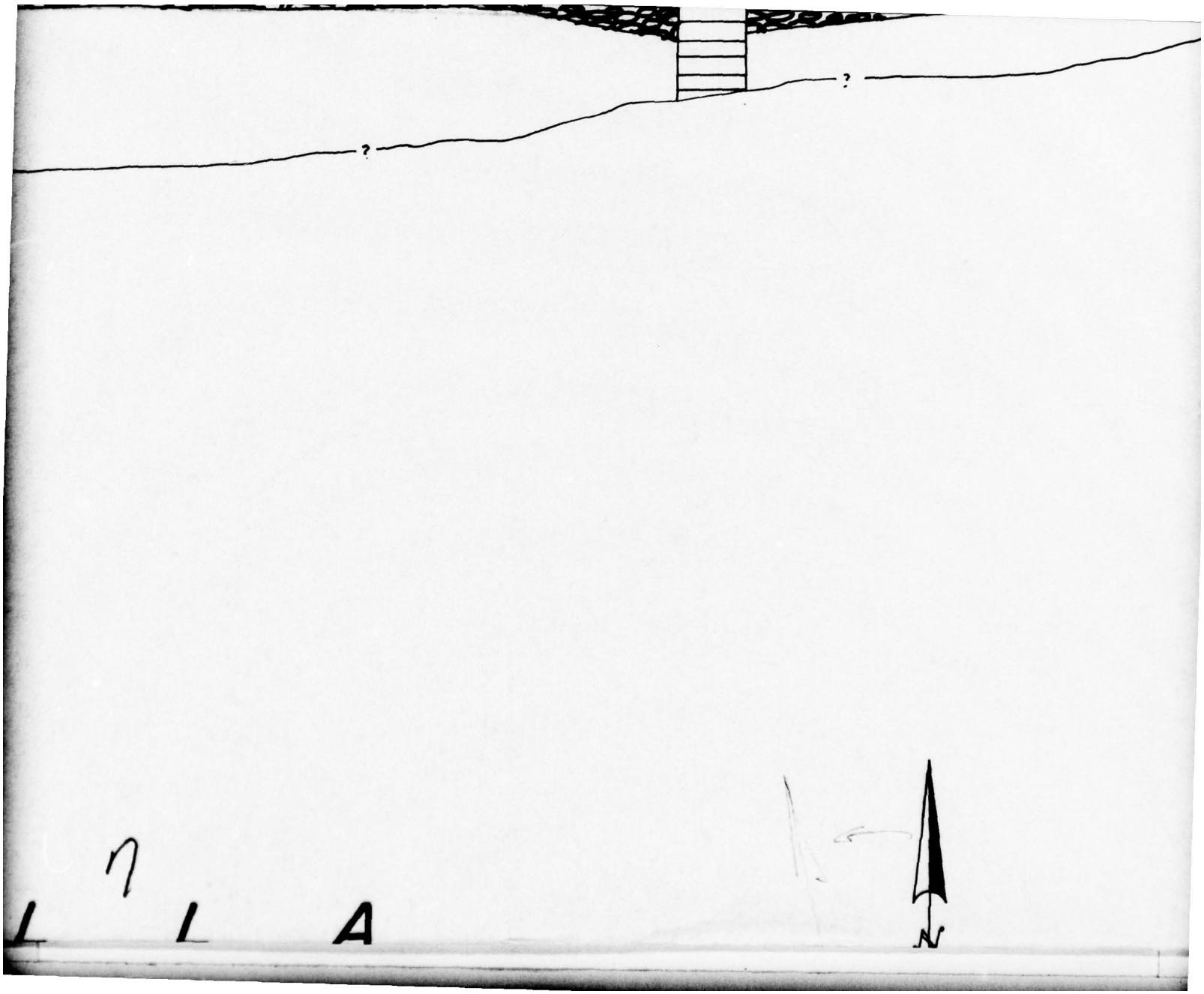
SECTION A-A'

0 10 20 30 40 50 60 ft

0 5 10 15 ft

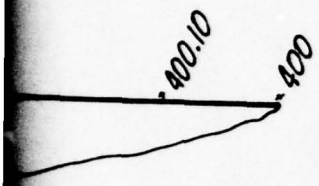
6

V A I H A L


?
?
N

ELEV. IN FEET
USGS DATUM

405



400

395

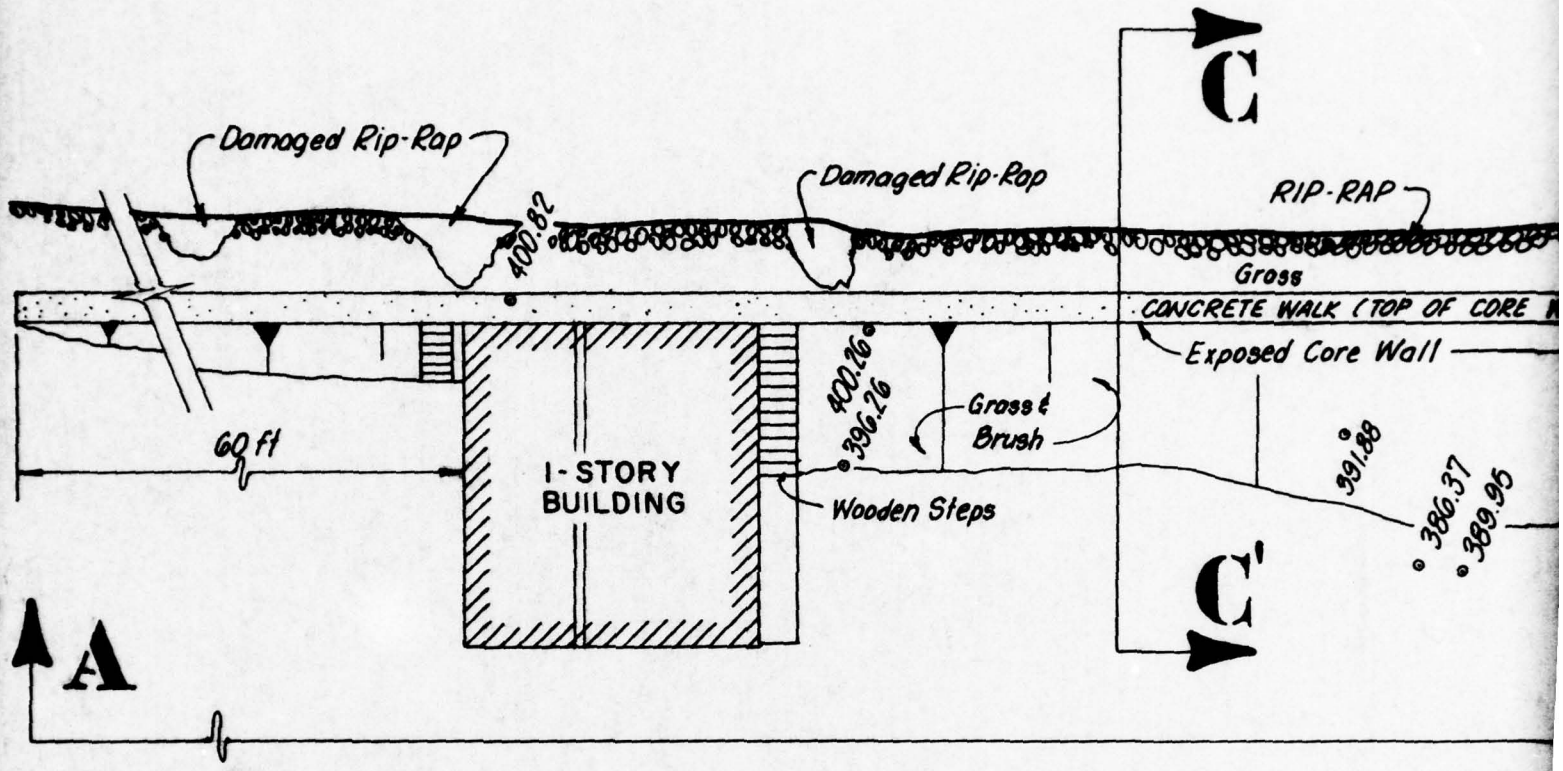
390

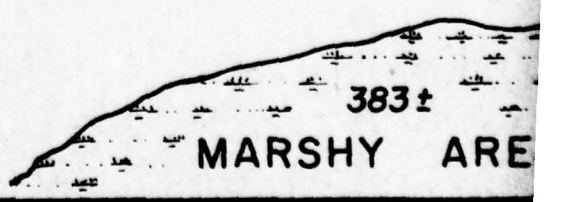
385

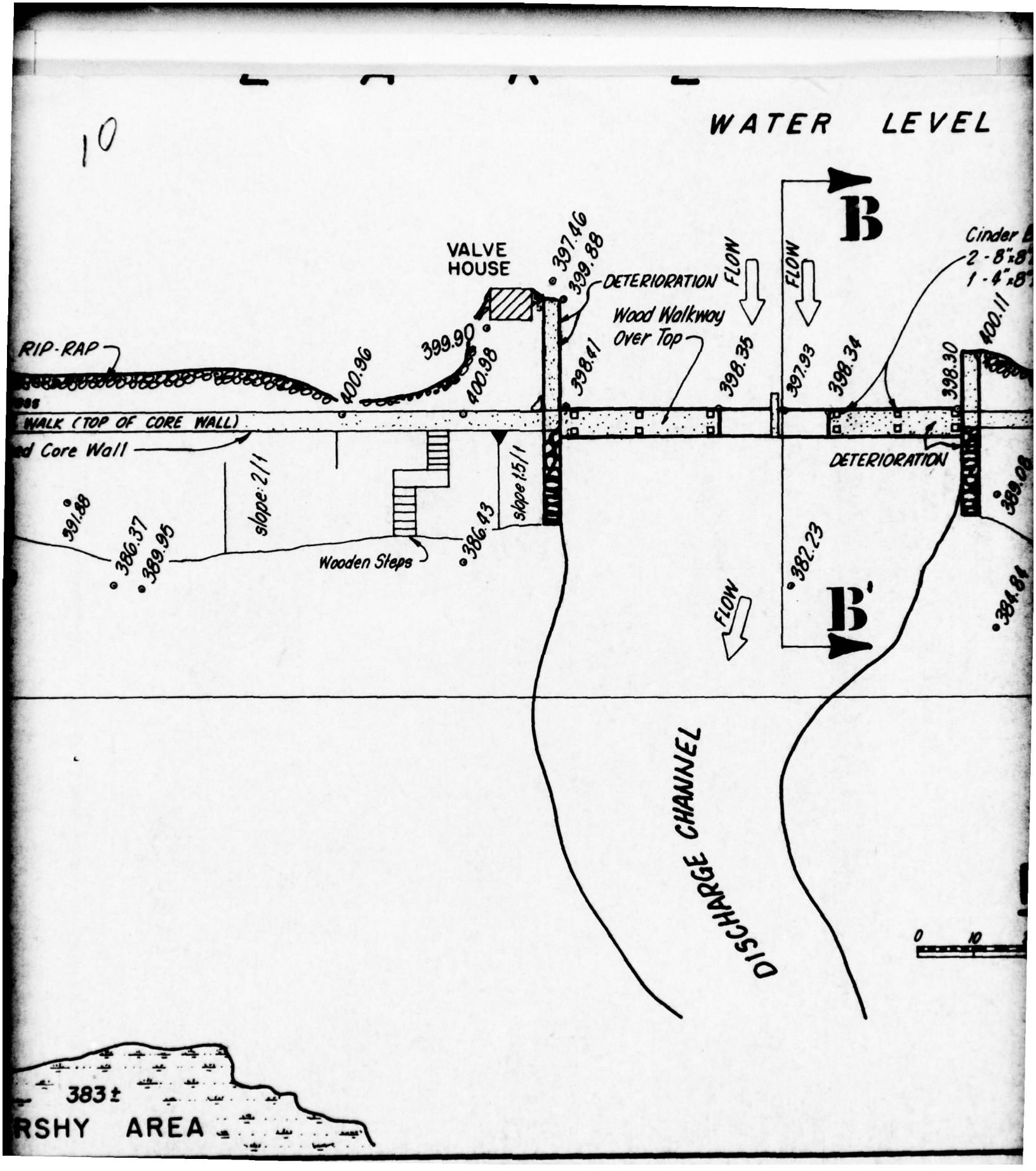
DATE	DESCRIPTION	NO.
REVISIONS		

8

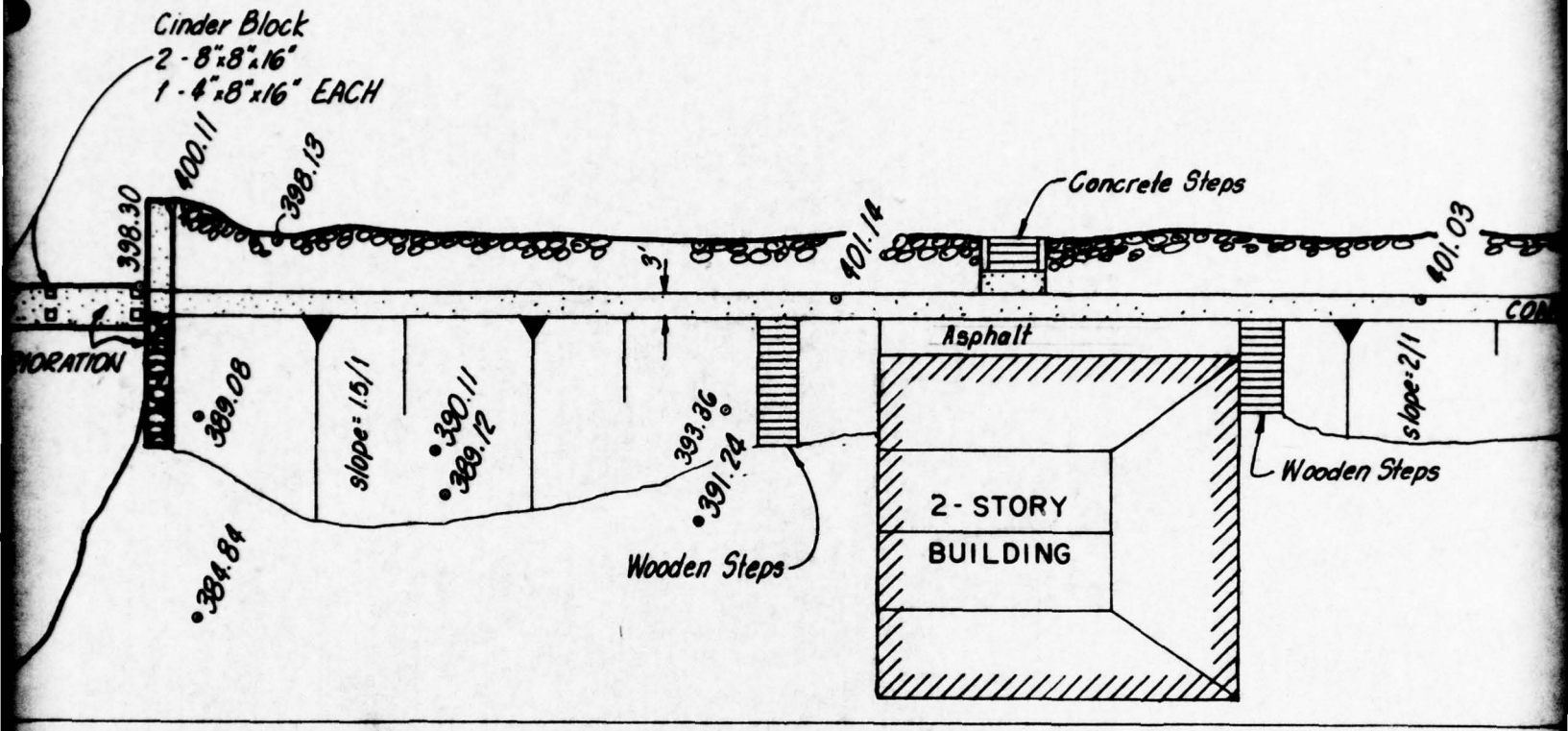
9


C
Damaged Rip-Rap
Damaged Rip-Rap
RIP-RAP
400.82
Grass
CONCRETE WALK (TOP OF CORE
Exposed Core Wall
400.26
396.26
Grass & Brush
60 ft
1-STORY BUILDING
Wooden Steps
391.88
386.37
389.95
C'
A

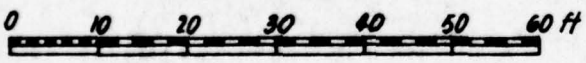

383±
MARSHY ARE


10
WATER LEVEL
B
B'
VALVE HOUSE
397.46
399.88
DETERIORATION
FLOW
FLOW
Wood Walkway Over Top
Cinder
2 - 8"x8"
1 - 4"x8"
400.11
RIP-RAP
400.96
399.90
400.98
398.41
398.35
397.93
398.34
398.30
WALK (TOP OF CORE WALL)
Core Wall
slope 2/1
slope 1:5/1
391.88
386.37
389.95
386.43
Wooden Steps
DETERIORATION
389.08
382.23
384.84
FLOW
DISCHARGE CHANNEL
0
10
383±
RSHY AREA

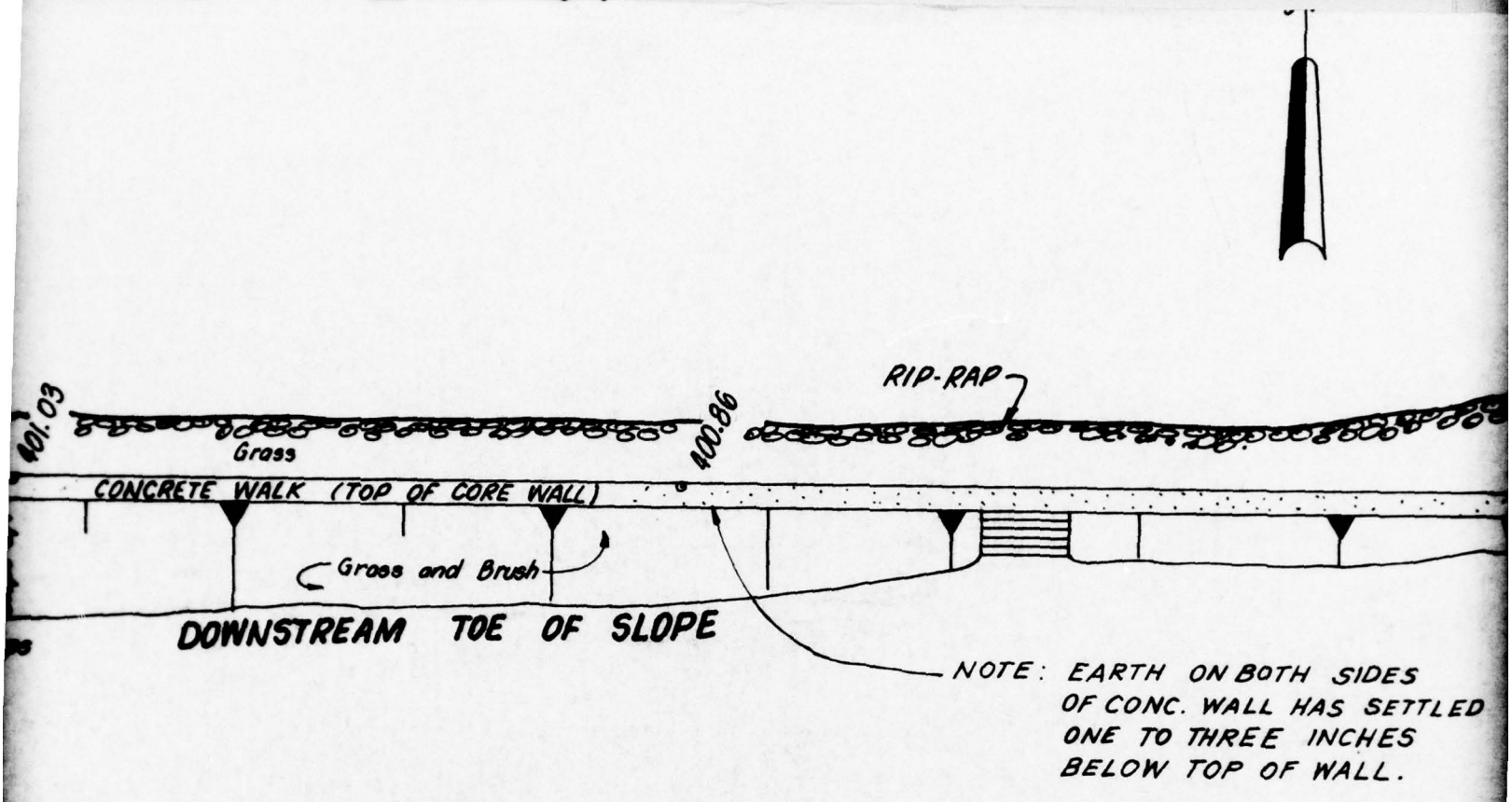
LEVEL ELEVATION = 398.13 (16 JUNE 1978)

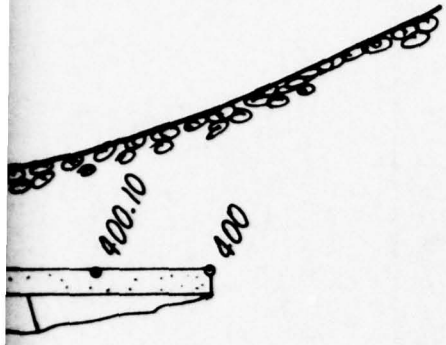


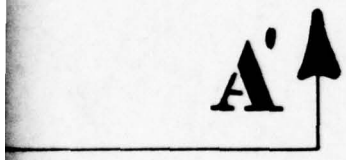
PLAN



11


401.03
Grass
400.86
RIP-RAP
CONCRETE WALK (TOP OF CORE WALL)
Grass and Brush
DOWNSTREAM TOE OF SLOPE
NOTE: EARTH ON BOTH SIDES OF CONC. WALL HAS SETTLED ONE TO THREE INCHES BELOW TOP OF WALL.





13

PROJECT

PHASE I

INSPECTION & EVALUATION of NEW JERSEY DAMS

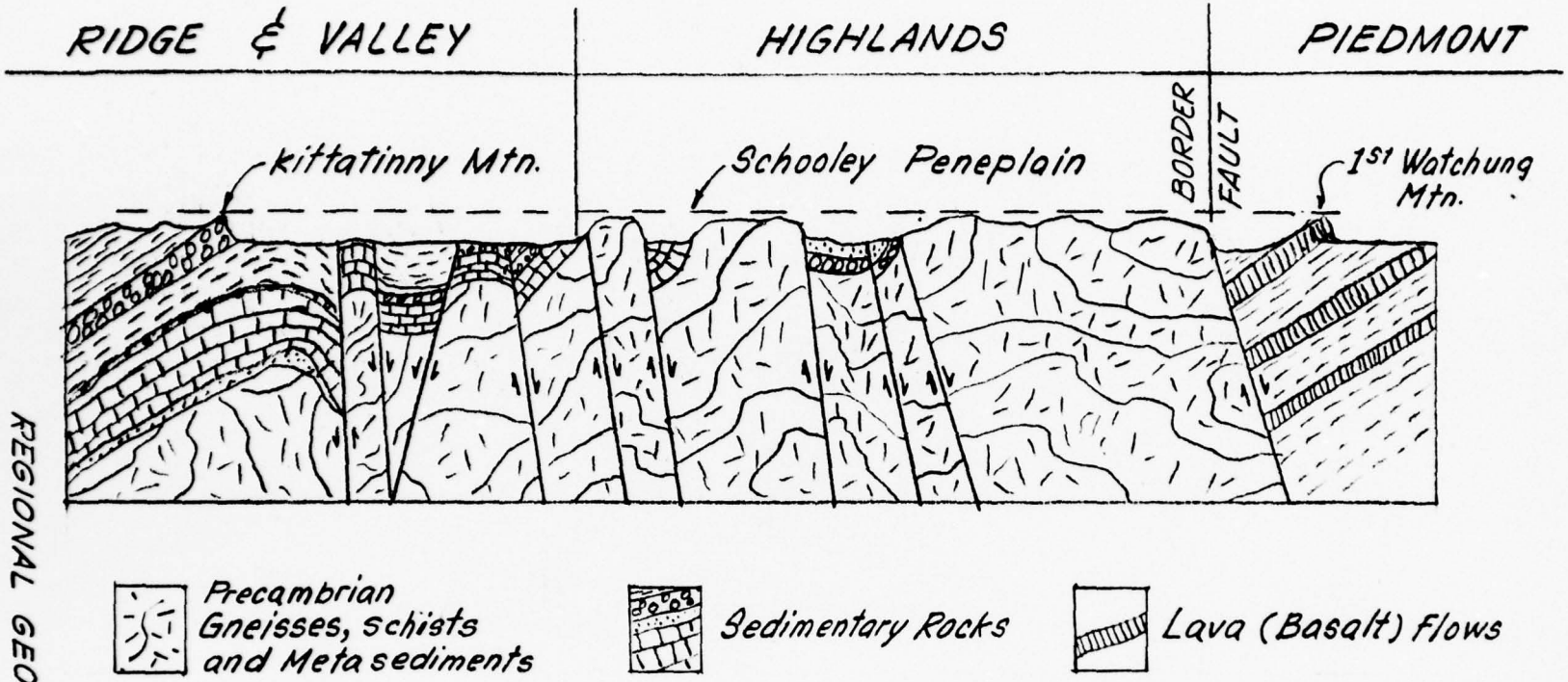
VALHALLA LAKE DAM

JUNE 1978

FED. ID. No. NJ00330

JOB NO.	J783
DATE	5 July 1978
SCALE	as noted
DRN. BY	JMR
CHKD. BY	DJL

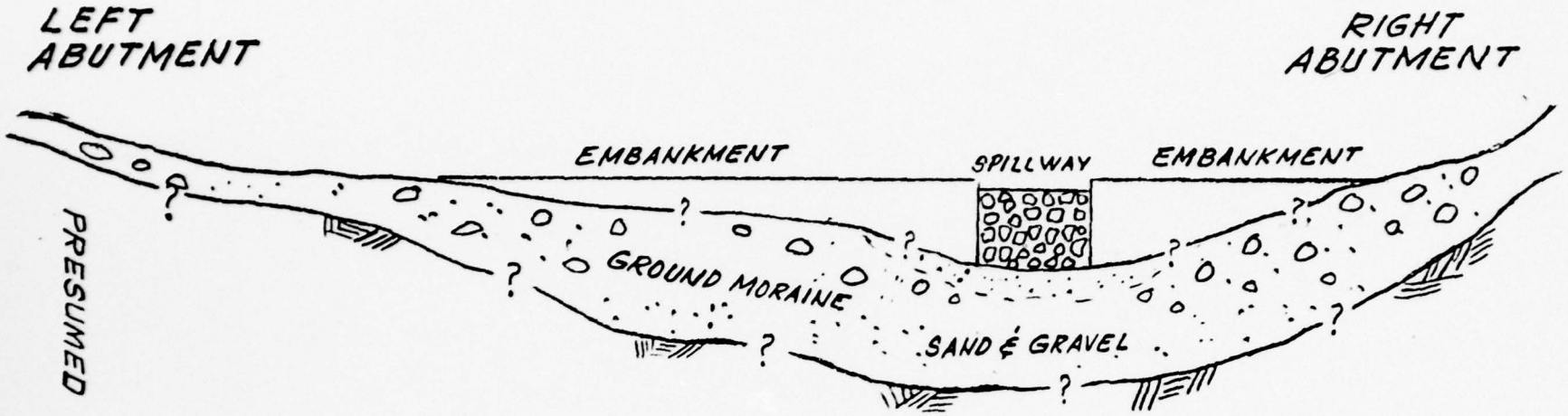
FIG. 2



Schematic Cross-section of New Jersey Highlands Physiographic Province (After Wolfe, 1977)

REGIONAL GEOLOGIC FEATURES

Fig 3



DIAGRAMMATIC SKETCH
LAKE VALHALLA DAM
(NO SCALE)

PRESUMED SITE GEOLOGIC FEATURES

Fig 4

APPENDIX 1

CHECK LIST

VISUAL INSPECTION

VALHALLA LAKE DAM

VALHALLA LAKE DAM

Check List
Visual Inspection
Phase 1

Name Dam Valhalla Lake Dam County Morris State New Jersey Coordinators N J DEP

Date(s) Inspection 7, 15 & 19 June 1978 Weather Sunny Temperature 70 - 80°F

Pool Elevation at Time of Inspection El 398 M.S.L. Tailwater at Time of Inspection El 383 M.S.L.

Inspection Personnel:

D. Leary D. Lachel

A. Puyo

C. Campbell

A. Puyo Recorder

VALHALLA LAKE DAM
CONCRETE/MASONRY DAM CORE

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEE PAGE ON LEAKAGE	NONE OBSERVED	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	CORE FOUNDATION LEVEL UNKNOWN	
DRAINS	NONE OBSERVED	
WATER PASSAGES	NONE OBSERVED	
FOUNDATION	UNKNOWN	

VALHALLA LAKE DAM

~~CONCRETE~~/MASONRY ~~DAM~~S CORE

SUAL EXAMINATION OF	OBERSVATIONS	REMARKS OR RECOMMENDATIONS
)RFACE CRACKS)NCRETE SURFACES	NONE OBSERVED	
TRUCTURAL CRACKING	NONE OBSERVED	
ERTICAL AND HORIZONTAL LIGNMENT	GOOD	
ONOLITH JOINTS	N.A.	
CONSTRUCTION JOINTS	N.A.	

VALHALLA LAKE DAM

EMBANKMENT

ISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
URFACE CRACKS	NONE OBSERVED	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	NONE OBSERVED	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	EROSION NEAR THE SIDE WALLS OF SPILLWAY DOWNSTREAM.	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	GOOD	
RIPRAP FAILURES	AT THREE LOCATIONS ON EMBANKMENT ON RIGHT SIDE OF SPILLWAY, UPSTREAM OF	

VALHALLA LAKE DAM

EMBANKMENT

ISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Masonry of side walls of spillway in poor condition downstream of spillway.	Need repair and strengtheni
ANY NOTICEABLE SEEPAGE	Left abutment 0.1 gpm	
STAFF GAGE AND RECORDER	NONE OBSERVED	

VALHALLA LAKE DAM

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	N.A.	
INTAKE STRUCTURE	Rusted valve and gate not used.	
OUTLET STRUCTURE	Not known.	
OUTLET CHANNEL	N.A.	

VALHALLA LAKE DAM

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	NONE OBSERVED	
APPROACH CHANNEL	GOOD	Check upstream slope of masonry. Need piezometer thru upstream backfill.
DISCHARGE CHANNEL	Stream bed contains boulders and very low masonry foot path across stream	
BRIDGE AND PIERS	Wood Bridge over spillway and light vehicular bridge over stream.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Boulders up to 8 ft. dia. Condition generally good.	
SLOPES	Side slopes 10 to 20 hor to 1 vert.	
APPROXIMATE NO. OF HOMES AND POPULATION	Montville reported to be nearest D/S city with population of 1,000.	

VALHALLA LAKE DAM

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	SATISFACTORY	
SEDIMENTATION	Unknown and probably small due to heavy foliage surrounding lake.	

APPENDIX 2

PHOTOGRAPHS

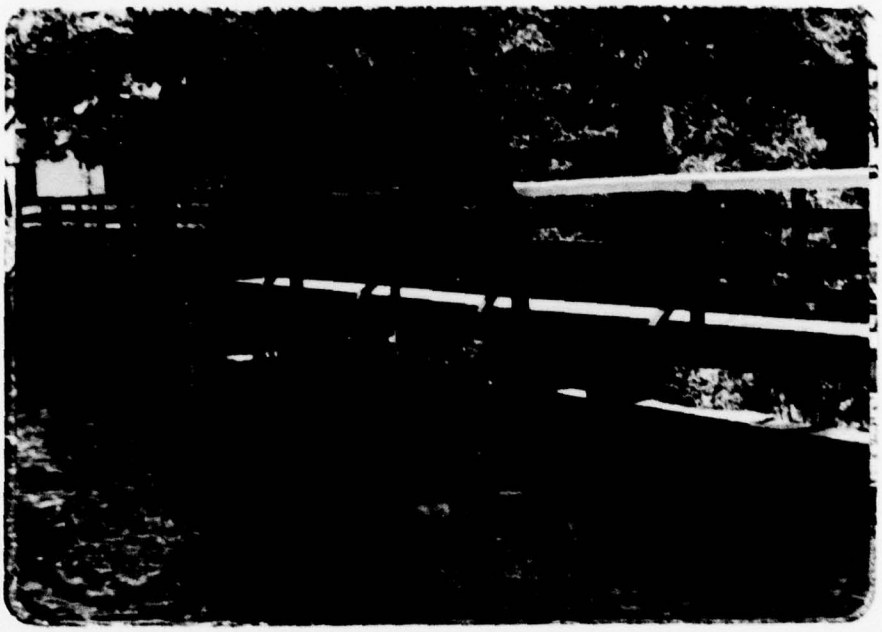
VALHALLA LAKE DAM

Left embankment and spillway looking east — 15 June 1978

Top of core wall in left embankment looking east — 15 June 1978

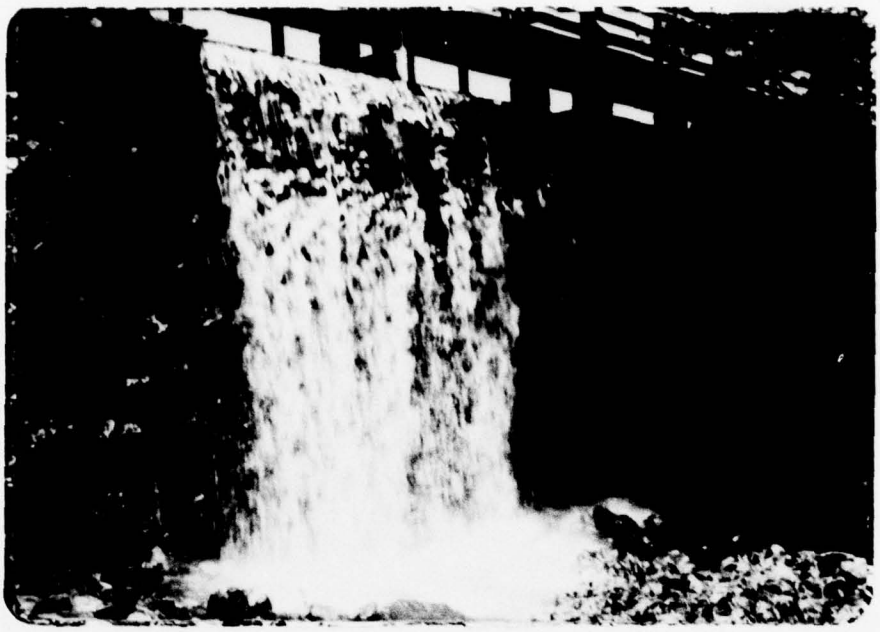
Erosion downstream of Core Wall in Right Embankment looking upstream — 15 June 1978

Top of Core wall and one story building downstream of wall. Note upstream erosion at right of wall looking west. — 15 June 1978



Top of Spillway Looking Downstream — 15 June 1978

Deterioration of concrete and Spillway Capstones — 15 June 1978



Free Fall Spillway 15 June 1978
Looking Upstream

Rocks at bottom of Spillway 15 June 1978

Downstream Spillway Right Sidewall. Note vegetation in masonry.

15 June 1978

Deterioration of upstream spillway right sidewall.

15 June 1978

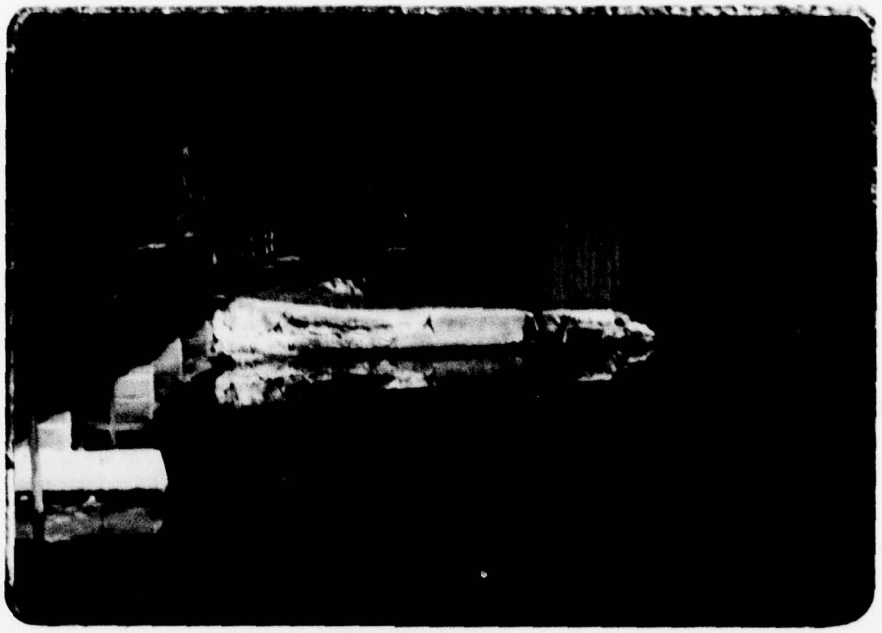
VALHALLA LAKE DAM

Minor seepage at left face of spillway — 15 June 1978

Minor seepage and absence of mortar in spillway masonry and right side wall. — 15 June 1978

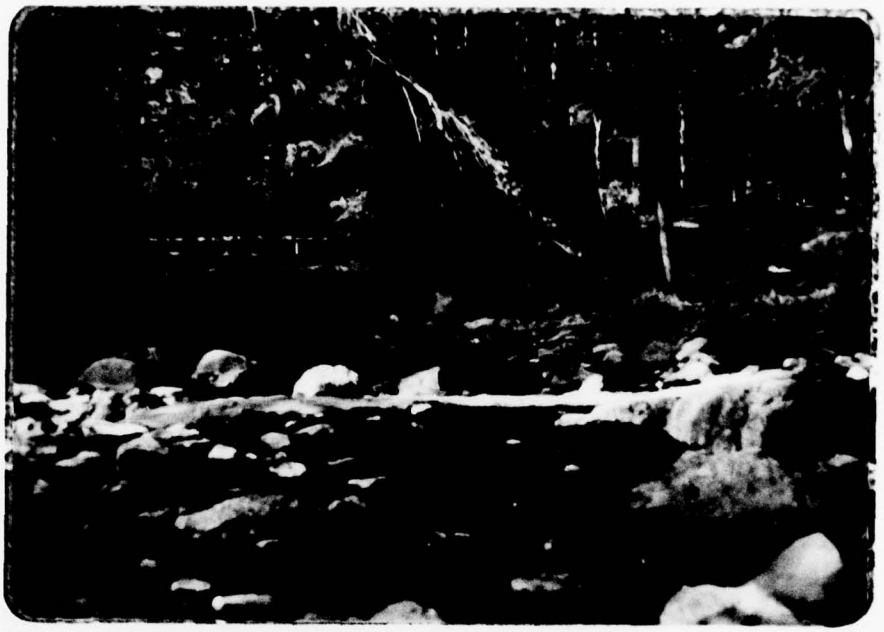
Erosion of upstream right embankment and rip-rap. 15 June 1978

Erosion of upstream right embankment and rip-rap. Note tree roots in embankment. 15 June 1978



Outlet valve house upstream of right embankment. 15 June 1978

Deterioration of spillway upstream right side wall. 15 June 1978



Low masonry footpath across discharge channel.

15 June 1978

Discharge channel looking downstream from spillway.

15 June 1978

VALHALLA LAKE DAM

APPENDIX 3

ENGINEERING COMPUTATIONS

VALHALLA LAKE DAM

LANGAN ENGINEERING ASSOCIATES, INC.

VALHALLA LAKE DAM

STABILITY OF SPILLWAY

width of crest 5.5 ft
water level 3 ft above spillway crest
Friction coefficient .8
Masonry 144 lb/FT3

UPSTREAM SLOPE ASSUMED 0.4/1

ASSUMPTION (A) No upstream backfilling

1) WALL WEIGHT	$144 \times 5.5 \times 17 = 13464$	$13464 \times \frac{5.5}{2}$	$= 37026$
	$+ 17^2 \times 0.2 \times 144 = 8340$	$8340 \left(5.5 + \frac{6.8}{3}\right)$	$= 64774$
2) WATER WEIGHT below crest	$\frac{6.8}{2} \times 17 \times 62.5 = 3620$	$3620 \left(5.5 + \frac{6.8 \times 2}{3}\right)$	$= 36320$
above crest	$(6.8 + 5.5) \times 3 \times 62.5 = 2306$	$2306 \times 12.3 \times 0.5$	$= 14182$
3) uplift	$12.3 \times 62.5 \times \frac{20}{2} = -7687$	$7687 \times \frac{12.3 \times 2}{3}$	-63033
4) horizontal force	$62.5 \times \frac{20^2}{2} = 12500$		$\} -77960$
	$-62.5 \frac{3^2}{2} = -280$		
	-12220		

Sliding SF $= \frac{0.8 [20045]}{12,220} = 1.31$ ✓

overturning $\frac{152302}{-141000} = 1.08$ ✓

ASSUMPTION (B) upstream back filling

Active pressure coefficient 0.5
immersed unit weight of soil 62.5 lb/ft³

1) WALL WEIGHT	-13464		-37026
	-8340		-64774
2) WATER WEIGHT	3620		-36320
	2306		14182
3) SOIL WEIGHT BELOW CREST	3620		-36320
HORIZ. FORCE 4) WATER	12220		-77960
4) SOIL $\frac{17^2}{2} \times 0.5 \times 62.5$	4515		-25590

Sliding SF $= \frac{0.8 \times 31350}{16735} = 1.50$ ✓

OVERT. SF $= \frac{188682}{103000} = 1.83$ ✓

BY JMAP DATE 6-19-78 VALHALLA LAKE DAM JOB NO.
CKD JC DATE 8-7-78 SHEET NO. 1 OF 3

LANGAN ENGINEERING ASSOCIATES, INC.

STABILITY OF SPILL WAY
(CONTINUED)

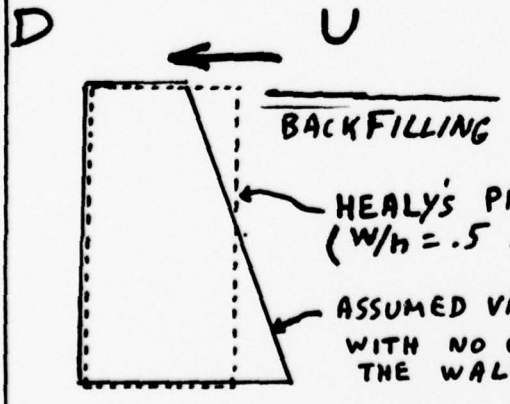
COMMENTS

Two assumptions have been considered.
Assumptions A is only given as a comparison: there is an upstream backfilling in front of the spillway.
Assumption B take into account an impervious backfilling with a perfect drainage along the upstream face of the masonry wall: in that case no uplift under the masonry wall has been considerd.

These computation show that it is not possible to get stability as long as the upstream slope of the core wall is greater that 0.4/1 - Besides an other ~~criteria~~ condition of the stability has also to be checked: the piezometric pressure along the upstream face of the masonry.

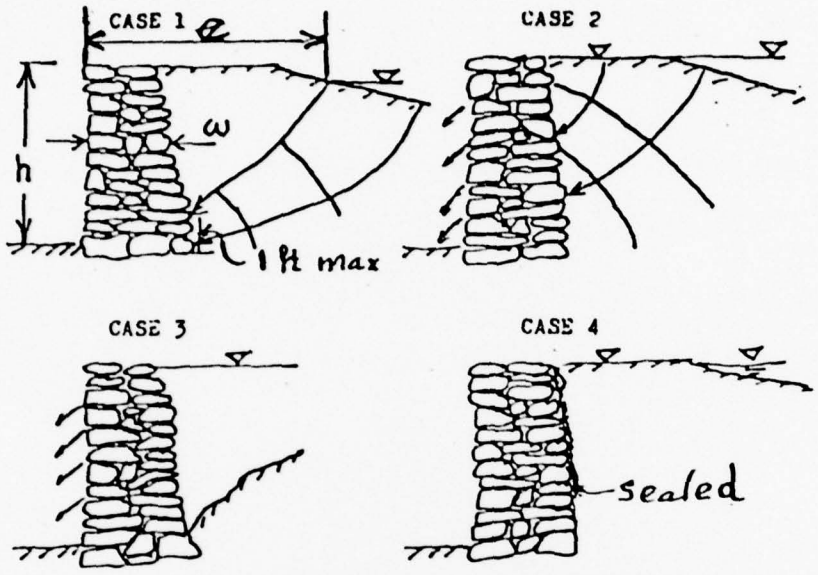
If the ~~pressure~~ piezometric pressure is a relatively high percentage of the ~~upstream~~ head a~~t~~ 0.4/1 slope will be too steep to provide enough stability.

As a comparison on the same sketch are shown the assumed profile for Valhalla and the Healy's profile for case 4 and W/h = 0.5



	SLIDING SF	OVERT.
HEALY'S PROFILE (W/h = .5 - CASE 4) →	1.3	1.4
ASSUMED VALHALLA PROFILE WITH NO UPLIFT INSIDE THE WALL →	1.50	1.83

BY JMAP DATE 5-19-78 VALHALLA LAKE DAM JOB NO.
CKD JC DATE 6-7-78 SHEET NO. 2 OF 3



$e > \frac{h}{2}$

FACTOR OF SAFETY

w/h	CASE 1 over turn	CASE 1 slide	CASE 2 over turn	CASE 2 slide	CASE 3 over turn	CASE 3 slide	CASE 4 over turn	CASE 4 slide
0.2	0.6	1.9	0.5	1.5	0.3	0.6	0.2	0.6
0.3	1.4	2.6	1.1	2.1	0.6	0.9	0.5	0.8
0.4	2.4	3.3	1.9	2.7	1.1	1.2	0.9	1.0
0.5	3.8	4.0	3.1	3.6	1.8	1.5	1.4	1.3

$\mu_{stone} = 0.7$ $\gamma_{stone} = 150$ pcf

$\gamma_{soil} = 130$ pcf $\phi_{soil} = 35°$

(After K.A. Healy)

STABILITY OF MASONRY WALL - EARTH DAMS

APPENDIX 4

HYDROLOGIC COMPUTATIONS

VALHALLA LAKE DAM

LANGAN ENGINEERING ASSOCIATES, INC.

HYDROLOGIC COMPUTATIONS
VALHALLA LAKE DAM

A. Location — Morris County N.J within the Passaic River Basin

B. Drainage Basin — 1518 ac or 2.37 sq mi
Area of Lake — 85 ac

C. Classification

Size - small < 1000 acft storage
Hazard - High

D. Spillway Design Flood (SDF) — ½ PMF to PMF

E PMP

1. Dam located in Zone 6
PMP = 22.5 inches (200 sq mi - 24 hr)

2. PMF must be adjusted for basin size by following the factors

Duration-hr	% 24 hr (for 10 sq miles)
0-6	112
0-12	123
0-24	132
0-48	142

Reduction Factor*
.8 for all hrs

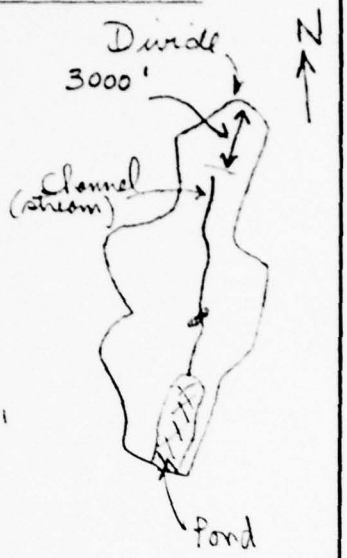
* page 48 "Small Dams"

BY JC DATE 8/8/78 Valhalla JOB NO. J-783
CHKD/REVD DATE 8/9/78 SHEET NO. 1 OF 11

LANGAN ENGINEERING ASSOCIATES, INC.

DETERMINE TIME OF CONCENTRATION

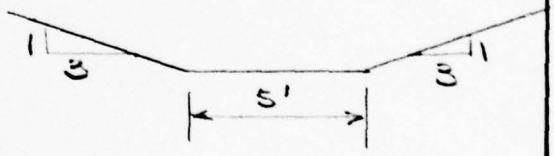
There is a stream running through the Valhalla water shed



From a site inspection the ground cover is "Forest with Heavy Ground Litter & Meadow" & The stream has irregular side slopes and bottom, & the section is filled with large growth

∴ take Mannings $n = 0.06$

Cross section of the stream will be approximated as



Slope of the stream $= \frac{H}{L}$

$H = 700 - 400 = 300'$

$L \simeq 10{,}000'$

$\therefore S = \frac{300}{10\,000} = .03$

The slope of the north portion of the water shed is $\simeq 4.3\%$

BY JC DATE 8/5 Valhalla JOB NO. J-783

CKD GED DATE 8-8-78 SHEET NO. 2 OF 11

LANGAN ENGINEERING ASSOCIATES, INC.

From SCS Tech Rel #55

A T_{AB} calculated from overland flow

Fig 3-1, vel = 0.5 ft/sec

$$T_{AB} = \frac{\text{length}}{\text{velocity}} = \frac{3000}{(.5)(3600)}$$

$$= 1.66 \text{ hr.}$$

We estimate that an approximate average value of Q in the stream during the time of concentration = 2000 CFS

$$Q = \frac{1.49}{n} AR^{2/3} S^{1/2}$$

$$2000 = \frac{1.49}{.06} AR^{2/3} (.03)^{1/2}$$

$$\therefore AR^{2/3} = 465$$

for the given cross section the depth of flow $y \cong 7$ ft

$$\therefore \text{Area of flow} = 50 + 2\left(7\frac{(21)}{2}\right) = 182 \text{ ft}^2$$

$$\text{velocity} = \frac{2000 \text{ CFS}}{182 \text{ ft}^2} = 10.98 \text{ ft/sec}$$

BY JC DATE 8/5 Valhalla JOB NO. J-783

CKD GED DATE 8.8.78 SHEET NO. 3 OF 11

$$T_{BC} = \frac{10000}{10.98(3600)} = 0.25 \text{ hours}$$

$$T_c = T_{AB} + T_{BC} = 1.66 + 0.25 = 1.91 \text{ hr}$$

B Determine T_c by Fig 3.3 Tech Rel #55

Avg Slope of watershed = 8%

l = Greatest flow length = 13,200 ft

Lag Time = 1.5 hours

$$\therefore T_c = \frac{1.5}{0.6} = 2.5 \text{ hours}$$

CHOOSE $T_c = 2.5$ hrs

DETERMINE TIME OF PEAK

$$T_p = \frac{D}{2} + 0.6T_c$$

Take D between .2 Tc & .3 Tc

$\therefore D = 0.6$ hr

$$T_p = \frac{0.6}{2} + 0.6(2.5) = 1.8 \text{ hours}$$

$$\therefore \boxed{T_p = 1.8 \text{ HOURS}}$$

UNIT HYDROGRAPH

Take q_p from SCS formula

$$q_p = \frac{484\,A}{T_p} = \frac{484(2.37)}{1.8} = 637 \text{ cfs}$$

A curvilinear hydrograph may be constructed from the values of q_p and T_p by using ratios tabulated in "Design of Small Dams", pg 74. Take the Time increments = D

HOURS	T/Tp	q/qp	UNIT HYDROGRAPH qp (cfs
0.6	0.33	0.18	114
1.2	0.67	0.74	472
1.8	1.00	1.00	637
2.4	1.33	0.83	529
3.0	1.67	0.51	325
3.6	2.00	0.32	204
4.2	2.33	0.20	127
4.8	2.67	0.12	76
5.4	3.00	0.075	48
6.0	3.33	0.044	28
6.6	3.37	0.024	15
7.2	4.00	0.018	12
7.8	4.33	0.016	10

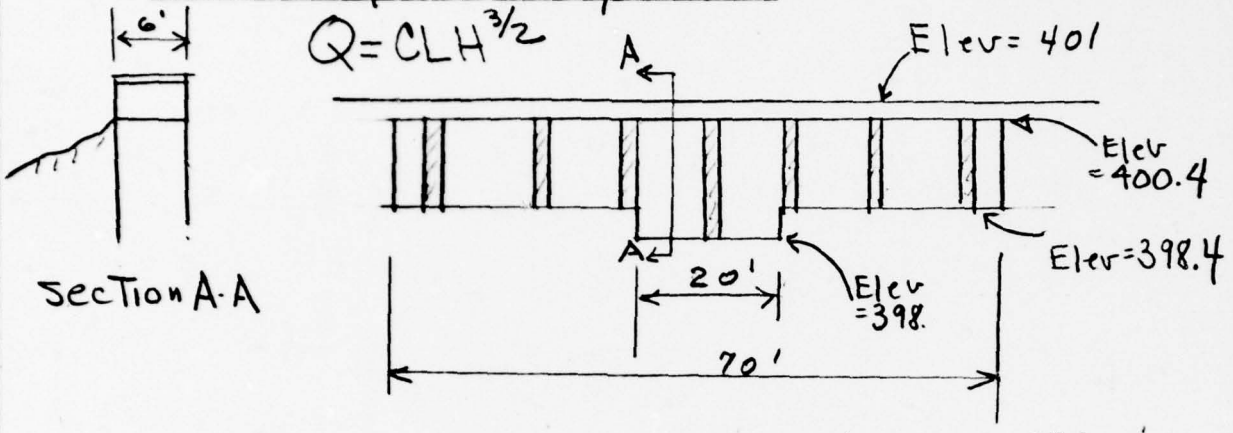
$\Sigma q = 2597$ cfs

LANGAN ENGINEERING ASSOCIATES, INC.

Area Under Unit Graph(in) = $\frac{2597(.6\ hr)3600(12)}{(1518\ Acres)43560} = 1.02"$

SPILLWAY CAPACITY

$Q = CLH^{3/2}$



Shape of weir is similar to those shown in "Handbook of Hydraulics, King & Brater, Fig 5-10, & 5-12. Tables for C values presented on page 5-50. Dam has similar shape as spillway.

choose

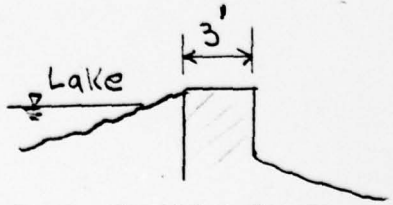
$C = 3.39$

For Center Spillway Crest at Elev = 398' $L = 19.2$ ft

$C = 3.39$

For Flange Spillway Crest at Elev = 398.4' $L = 45$ ft

For Reservoir Top Elev = 400'



Reser. cross section

∴ Take $C = 3.39$

BY JC DATE 8/5 Valhalla JOB NO. J-783

CKD CED DATE 8.8.78 Rev 8.15.78 SHEET NO. 6 OF 11

LANGAN ENGINEERING ASSOCIATES, INC.

Elev (ft)	Center H (ft)	Center Q℄ (cfs)	Flanges H (ft)	Flanges Qc (cfs)	Reservoir H (ft)	Reservoir L (ft)	Reservoir Q (cfs)	Q TOTAL (cfs)
398.0	0	0						0
398.2	0.2	6						6
398.4	0.4	16	0	0				16
399.0	1.0	66	0.6	72				138
399.4	1.4	108	1.0	155				263
400.0	2.0	182	1.6	323				505
400.4	2.4	241	2.0	440				680
401.0	3.0	270	2.6	491	0			761
402.0	4.0	416	3.6	802	1	300	1017	2235
404.0	6.0	765	5.6	1557	3	300	5284	7606
406.0	8.0	1178	7.6	3196	5	300	11370	15744

NOTE Flows for walkway adjusted for flow blocked by walkway in proportion to area of walkway to total spillway area

RESERVOIR STORAGE CAPACITY

1. Assume embankment slopes up at 1 vertical vs 5 horiz
2. Equivalent square for area = 85 acres

$\sqrt{85 \times 43560} = 1924' = L_e$

3.

H	Le	Area ac	Incre. Storage	Σ Storage
0	1924	85	0	0
1	1934	85.87	85.43	85.43
2	1944	86.76	86.26	171.69
3	1954	87.65	87.21	258.9
4	1964	88.55	88.10	347.00
6	1984	90.36	178.91	525.0
8	2004	92.2	182.56	707

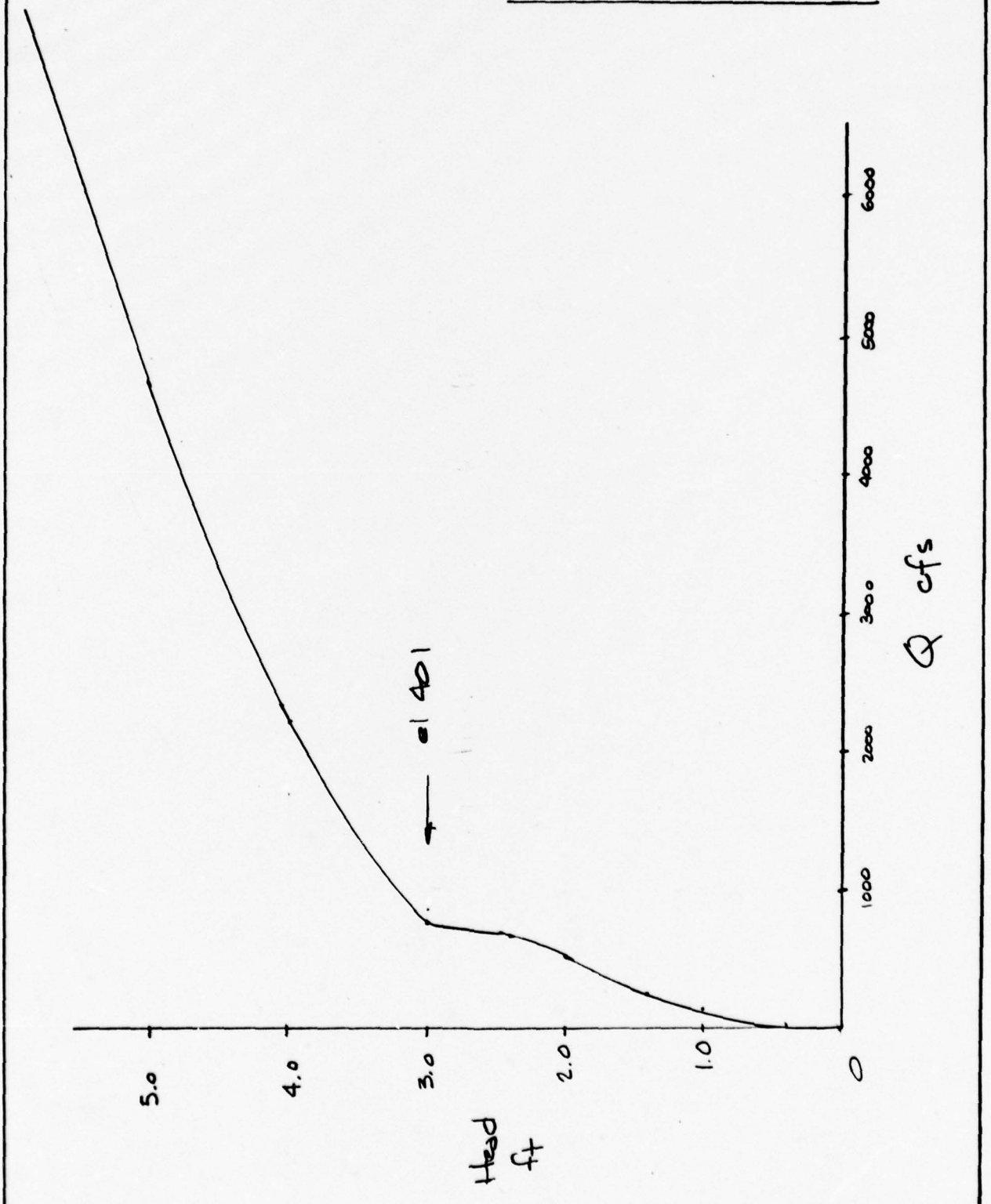
BY JC DATE 8/5 Valhalla JOB NO. J-783

CKD CED DATE 8.8.78 SHEET NO. 7 OF 11

Rev 8.15.78

LANGAN ENGINEERING ASSOCIATES, INC.

SPILLWAY CAPACITY

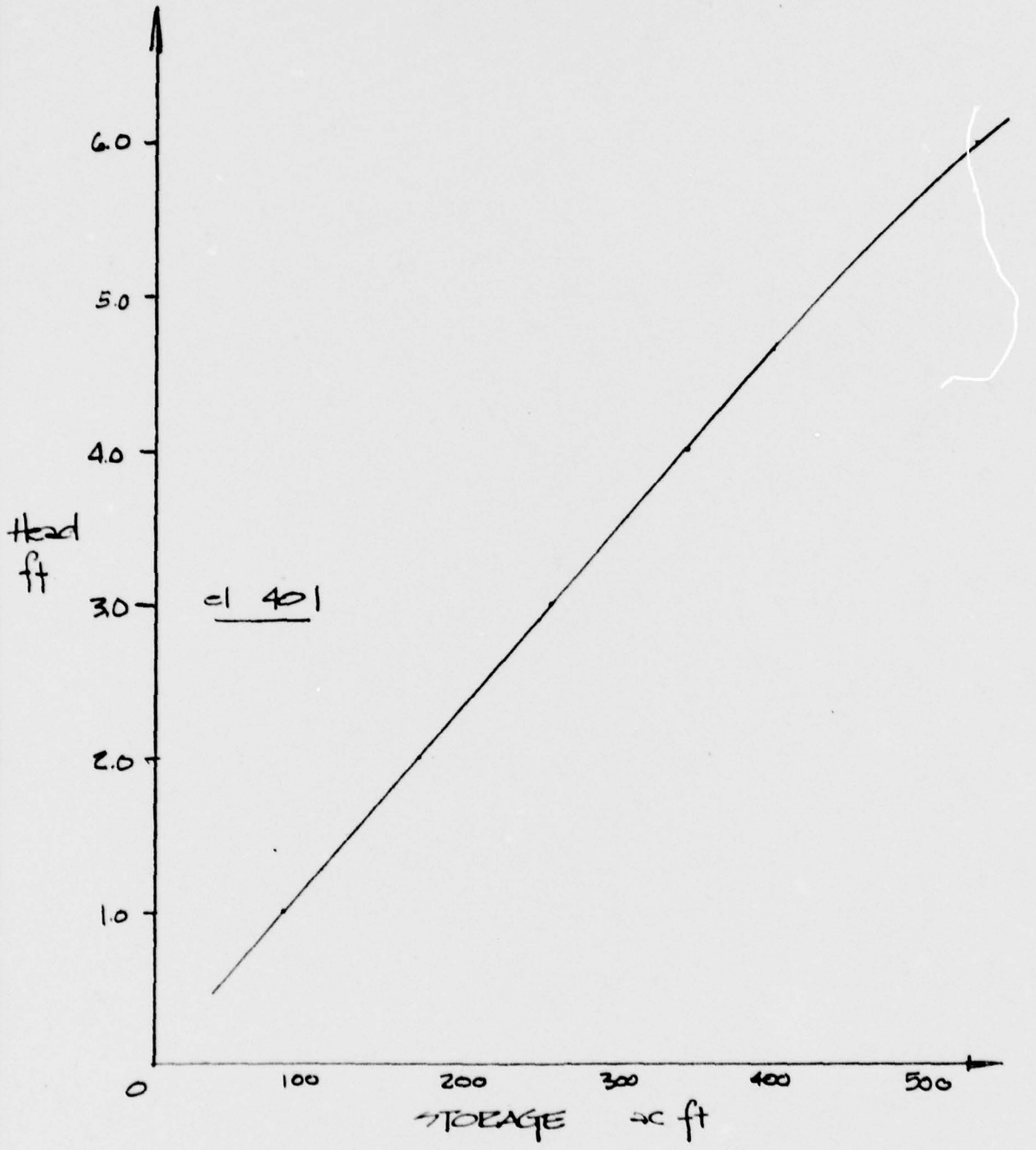


BY JC DATE _____ Valhalla JOB NO. J-783

CKD. GED DATE 8.8.78 Rev 8.15.78 SHEET NO. 8 OF 11

LANGAN ENGINEERING ASSOCIATES, INC.

STORAGE CAPACITY CURVE



BY JC DATE ____ Valhalla JOB NO. J-783

CKD LGEO DATE 8.8.78 Rev 8.15.78 SHEET NO. 9 OF 11

LANGAN ENGINEERING ASSOCIATES, INC.

H (ft)	Q TOTAL (cfs)	STorage (Acre-FT)
0	0	0
.2	6	17
.4	16	34
1.0	132	85
1.4	263	119
2.0	505	171
2.4	680	205
3.0	761	259
4.0	2235	347
6.0	7606	525
8.0	15744	707

FLOOD ROUTING + HYDROGRAPH

1 Flood routing and hydrograph determined using HEC 1. Output attached

2. PMF = 6652 cfs (routed to 6577.)
½PMF = 3326 cfs (routed to 3288)

3. Flood routing indicates dam will overtop for the PMF by 2.6 ft (el 403.6) and the ½ PMF by 1.4 ft (el 402.4)

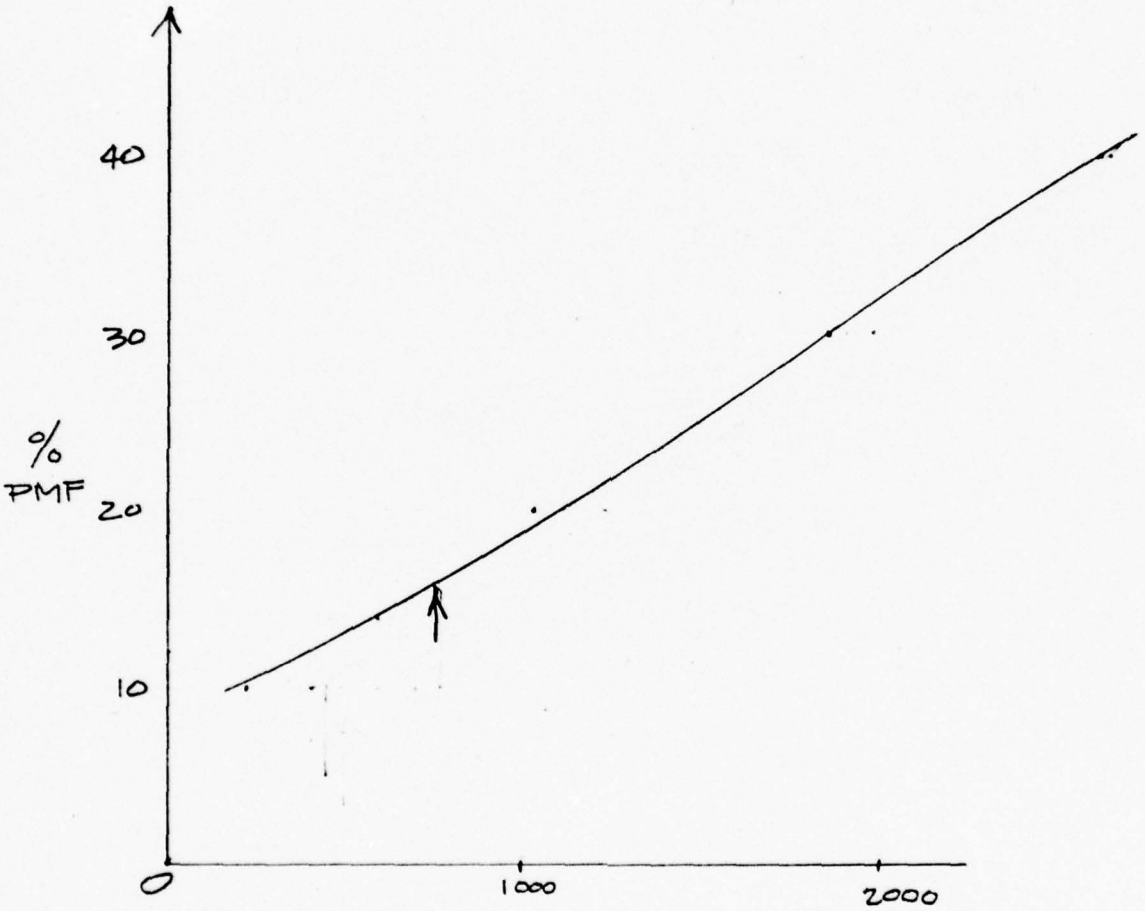
(OVERTOPPING OCCURS AT ~ el 401)

BY JC DATE 8/5 Valhalla JOB NO. J-783
CKD CED DATE 8.8.78 Rev 8.15.78 SHEET NO. 10 OF 11

LANGAN ENGINEERING ASSOCIATES, INC.

OVERTOPPING POTENTIAL

1. Routing for various %PMF performed using HEC 1; output attached
2. Peak outflow vs % PMF plotted



3. OVERTOPPING OCCURS AT EL 401'- OR 760 cfs

∴ DAM CAN PASS APPROX 16% OF PMF W/O OVERTOPPING

BY JC DATE 7 Aug 78 Valhalla JOB NO. J-783

CKD. GED DATE 8.8.78 REV 8.15.78 SHEET NO. 11 OF 11


Deer Pond
Taylortown
Reservoir
Taylortown Ave
Boonton
Taylortown Reservoir
Boonton
Mtn.
Camp Meeker
Surprise Lake
Mtn.
Canal
Lane
Indian
Road
Jacksonville
Road
Main
Towaco
School No. 4
Montville Avenue
Cem.
Lane


DRAINAGE BASIN
LAKE VALHALLA
LANGAN ENGINEERING ASSOCIATES, INC.
MAP SOURCE USGS
BOONTON & POMPTON PLAINS
SCALE 1" = 2000'
East Lake
Reservoir
DITCH

HEC-1 OUTPUT

VALHALLA LAKE DAM

```
 listcf vout8 'breakdown'-

VOUT8       12:53 AUG 15,'78

AMDS09 JOB 6558 (LANG0314) IN BREAKDOWN
 CDC1B            LANG0314       6558       FT06F001          10.50.30  15 AUG 78         GED                              GED

*****************************
HEC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHANGE NO. 01
*****************************

*****************************
HEC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHANGE NO. 01
*****************************
                          VALHALLA DAM
                          DETERMINE INFLOW HYDROGRAPH FOR PMF AND .5PMF AND ROUT
                          N.J. DAM INSPECTION

                                                JOB SPECIFICATION
                                      NQ    NHR   NMIN   IDAY    IHR   IMIN METRC   IPLT   IPRT NSTAN
                                      90      0     36      0      0      0      0      0      0      0
                                                          JOPER      NWT
                                                              5        0


                                                MULTI-PLAN ANALYSES TO BE PERFORMED
                                                     NPLAN# 1 NRTIO# 2 LRTIO# 1
                                    RTIOS#    1.00    0.50


          **********          **********          **********          **********          **********

                                                SUB-AREA RUNOFF COMPUTATION

                                    COMPUTE HYDROGRAPH
                                              ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME
                                                  1        0        0        0        0        0        1

                                                                HYDROGRAPH DATA
                                  IHYDG     IUHG    TAREA     SNAP    TRSDA    TRSPC    RATIO    ISNOW    ISAME    LOCAL
                                      1       -1     2.37      0.0     2.37     0.80     0.0          0        0        0

                                                                PRECIP DATA
                                         SPFE      PMS       R6       R12      R24      R48      R72      R96
                                          .  .     ..  ..   ...  ..   ...  ..   ...  ..   ...  ..     .  .     .  .
```

0.0 22.50 112.00 125.00 132.00 142.00 0.0 0.0

LOSS DATA

STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.0	0.0	1.00	0.0	0.0	1.00	1.00	0.20	0.0	0.0

GIVEN UNIT GRAPH, NUHGQ# 13

114. 472. 637. 529. 325. 204. 127. 76. 48. 28.
15. 12. 10.

UNIT GRAPH TOTALS 2597. CFS OR 1.02 INCHES OVER THE AREA

RECESSION DATA

STRTQ# -2.00 QRCSN# 0.0 RTIOR# 1.00

END-OF-PERIOD FLOW

TIME	RAIN	EXCS	COMP Q
1	0.00	0.00	5.
2	0.00	0.00	5.
3	0.00	0.00	5.
4	0.00	0.00	5.
5	0.00	0.00	5.
6	0.00	0.00	5.
7	0.00	0.00	5.
8	0.00	0.00	5.
9	0.00	0.00	5.
10	0.00	0.00	5.
11	0.01	0.00	5.
12	0.01	0.00	5.
13	0.01	0.00	5.
14	0.01	0.00	5.
15	0.01	0.00	5.
16	0.01	0.00	5.
17	0.01	0.00	5.
18	0.01	0.00	5.
19	0.01	0.00	5.
20	0.01	0.00	5.
21	0.09	0.00	5.
22	0.11	0.00	5.
23	0.14	0.00	5.
24	0.35	0.00	5.
25	0.13	0.00	5.
26	0.10	0.00	5.
27	0.23	0.11	18.
28	0.23	0.11	70.
29	0.23	0.11	140.
30	0.23	0.11	198.
31	0.01	0.00	221.
32	0.01	0.00	191.
33	0.01	0.00	135.
34	0.01	0.00	85.
35	0.01	0.00	55.

36	0.01	0.00	31.
37	0.01	0.00	23.
38	0.01	0.00	16.
39	0.01	0.00	12.
40	0.01	0.00	9.
41	0.06	0.00	7.
42	0.06	0.00	6.
43	0.06	0.00	5.
44	0.06	0.00	5.
45	0.06	0.00	5.
46	0.06	0.00	5.
47	0.06	0.00	5.
48	0.06	0.00	5.
49	0.06	0.00	5.
50	0.06	0.00	5.
51	0.20	0.08	14.
52	0.20	0.08	50.
53	0.20	0.08	100.
54	0.20	0.08	141.
55	0.20	0.08	167.
56	0.20	0.08	183.
57	0.20	0.08	193.
58	0.20	0.08	198.
59	0.20	0.08	202.
60	0.20	0.08	204.
61	1.21	1.09	321.
62	1.45	1.33	827.
63	1.81	1.69	1628.
64	4.60	4.48	2805.
65	1.69	1.57	4475.
66	1.33	1.21	5313.
67	3.04	2.92	5254.
68	3.04	2.92	5378.
69	3.04	2.92	6010.
70	3.04	2.92	6622.
71	0.10	0.00	6652.
72	0.10	0.00	5517.
73	0.10	0.00	3805.
74	0.10	0.00	2342.
75	0.10	0.00	1460.
76	0.10	0.00	900.
77	0.10	0.00	522.
78	0.10	0.00	317.
79	0.10	0.00	194.
80	0.10	0.00	113.
81	0.0	0.0	69.
82	0.0	0.0	34.
83	0.0	0.0	5.
84	0.0	0.0	5.
85	0.0	0.0	5.
86	0.0	0.0	5.

87	0.0	0.0	5.
88	0.0	0.0	5.
89	0.0	0.0	5.
90	0.0	0.0	5.
SUM	29.89	24.29	63441.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6652.	5183.	1551.	705.	63430.
INCHES		20.34	24.35	24.90	24.90
AC-FT		2571.	3078.	3147.	3147.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
5.	5.	5.	5.	5.	5.	18.	70.	140.	198.
221.	191.	135.	85.	55.	35.	23.	16.	12.	9.
7.	6.	5.	5.	5.	5.	5.	5.	5.	5.
14.	50.	100.	141.	167.	183.	193.	198.	202.	204.
321.	827.	1628.	2805.	4475.	5313.	5254.	5378.	6010.	6622.
6652.	5517.	3805.	2342.	1460.	900.	522.	317.	194.	113.
69.	34.	5.	5.	5.	5.	5.	5.	5.	5.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6652.	5183.	1551.	705.	63430.
INCHES		20.34	24.35	24.90	24.90
AC-FT		2571.	3078.	3147.	3147.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	3.	9.	35.	70.	99.
110.	96.	68.	43.	27.	18.	12.	8.	6.	4.
4.	3.	2.	2.	2.	2.	2.	2.	2.	2.
7.	25.	50.	71.	83.	91.	96.	99.	101.	102.
160.	413.	814.	1403.	2238.	2656.	2627.	2689.	3005.	3311.
3326.	2758.	1903.	1171.	730.	450.	261.	159.	97.	56.
34.	17.	2.	2.	2.	2.	2.	2.	2.	2.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3326.	2592.	776.	352.	31715.
INCHES		10.17	12.18	12.45	12.45
AC-FT		1286.	1539.	1573.	1573.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTING COMPUTATIONS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
1	1	0	0	0	0	1

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	0.

STORAGE#	17.	34.	85.	119.	171.	205.	259.	347.	525.	707.
OUTFLOW#	6.	16.	138.	263.	505.	680.	761.	2235.	7606.	15744.

STATION 1, PLAN 1, RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	4.	9.
15.	32.	47.	54.	56.	55.	52.	48.	44.	41.
37.	33.	30.	27.	25.	23.	21.	19.	17.	16.
16.	17.	23.	34.	48.	62.	76.	89.	102.	113.
130.	200.	398.	718.	2123.	4443.	5163.	5294.	5636.	6218.
6577.	6155.	4876.	3333.	2147.	1580.	1070.	752.	717.	668.
537.	434.	348.	277.	229.	191.	160.	135.	121.	108.

STOR

0.	0.	1.	1.	1.	1.	2.	2.	2.	2.
3.	3.	3.	3.	4.	4.	4.	4.	4.	5.
5.	5.	5.	6.	6.	6.	7.	9.	14.	22.
32.	41.	47.	50.	51.	50.	49.	47.	46.	44.
43.	41.	40.	39.	38.	37.	36.	35.	35.	34.
34.	34.	37.	42.	47.	53.	59.	65.	70.	75.
82.	102.	148.	230.	340.	420.	444.	448.	460.	479.
491.	477.	435.	383.	342.	308.	277.	253.	229.	203.
177.	156.	137.	122.	110.	100.	91.	84.	78.	72.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6577.	4984.	1533.	689.	62024.
INCHES		19.56	24.07	24.34	24.34
AC-FT		2473.	3042.	3077.	3077.

STATION 1, PLAN 1, RTIO 2

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	3.
5.	8.	10.	12.	12.	13.	13.	13.	12.	12.
12.	12.	11.	11.	11.	11.	10.	10.	10.	10.
10.	10.	11.	12.	14.	16.	25.	33.	41.	47.
57.	83.	144.	315.	638.	1051.	1985.	2446.	2789.	3105.
3288.	3078.	2438.	1845.	1320.	892.	739.	701.	615.	494.
402.	324.	260.	217.	181.	151.	130.	116.	103.	92.

STOR

0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
1.	1.	2.	2.	2.	2.	2.	2.	2.	2.
2.	3.	3.	3.	3.	3.	3.	4.	7.	11.
16.	21.	24.	27.	28.	28.	28.	28.	28.	28.
27.	27.	26.	26.	25.	25.	25.	24.	24.	23.
23.	24.	25.	27.	31.	34.	38.	41.	44.	47.
51.	62.	87.	130.	197.	276.	332.	354.	365.	376.
382.	375.	354.	324.	292.	267.	244.	219.	192.	169.
149.	132.	118.	106.	97.	89.	82.	76.	70.	66.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3288.	2334.	755.	338.	30436.
INCHES		9.16	11.86	11.95	11.95
AC-FT		1158.	1499.	1510.	1510.

********** ********** ********** ********** **********

PEAK FLOW SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

OPERATION	STATION	PLAN	RATIOS APPLIED TO FLOWS 1.00	0.50
HYDROGRAPH AT	1	1	6652.	3326.
		2	0.	0.
ROUTED TO	1	1	6577.	3288.
		2	0.	0.

MCDONNELL DOUGLAS AUTOMATION COMPANY -- ST. LOUIS
OS/MVT RELEASE 21.7 COMPUTER SYSTEM SY0

ASP JOB NO. = 6558 JOBNAME = LANG0314 START TIME = 10.5
B-s

```
listcf vout7 'breakdown'-

VOUT7      13:07 AUG 15,'78

AMDS09 JOB 6546 (LANG0322) IN BREAKDOWN
 CDC18          LANG0322      6546      FT06F001        10.50.11  15 AUG 78        GED                              GED

******************************
HEC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHANGE NO. 01
******************************
THIS CARD SLOUGHED LOOKING FOR LTRA --/3

******************************
HEC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHANGE NO. 01
******************************
                          VALHALLA DAM
                          DETERMINE INFLOW HYDROGRAPH FOR PMF AND .5PMF AND ROUT
                          % PMF

                                                JOB SPECIFICATION
                                 NQ    NHR   NMIN   IDAY    IHR   IMIN METRC   IPLT   IPRT NSTAN
                                 90      0     36      0      0      0      0      0     40      0
                                                      JOPER      NWT
                                                          5        0


                             PEAK FLOW SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS


                                                                    RATIOS APPLIED TO FLOWS
OPERATION      STATION     PLAN      1.00       0.50       0.40       0.30       0.20       0.10


HYDROGRAPH AT        1        1      6652.      3326.      2661.      1996.      1330.       665.
                              2         0.         0.         0.         0.         0.         0.
ROUTED TO            1        1      6577.      3288.      2615.      1862.      1075.       458.
                              2         0.         0.         0.         0.         0.         0.
```

APPENDIX 5

INVENTORY FORMS 4474 and 4474A

VALHALLA LAKE DAM

PART I – INVENTORY OF DAMS IN THE UNITED STATES
(PURSUANT TO PUBLIC LAW 92–367)

See reverse side for instructions.

/

[2] [3] [4] [5] [6] [7] [8] [9]

IDENTIFICATION	DIVISION	STATE	COUNTY	CONGR DIST	STATE	COUNTY	CONGR DIST	NAME
	NAD	NJ	027	13				LAKE VALHALLA DAM

[13]

IDENTIFICATION (Continued)	POPULAR NAME
	LAKE VAL

[15] [16] [17]

LOCATION	REGION	BASIN	RIVER OR STREAM	NEA CITY
	02	03	TR ROCKAWAY RIVER	MONTVILLE

[21] [22] [23] [24] [25] [26]

STATISTICS	TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (ft)	HYDRAULIC HEIGHT (ft)	IMPOUNDING CAP MAXIMUM (acre – ft.)
	RE	1930	R	19	19	725

[28]

REMARKS	REMARKS
	21-22-23-24-25-26-27-ESTIMATED

ENG. FORM 4474

S IN THE UNITED STATES
JC LAW 92-367)

instructions.

[1]

STATE	IDENTITY NUMBER					
1	2	3	4	5	6	7
N	J	0	0	3	3	0

[9] [10] [11] [12]

NAME	LATITUDE (North)			LONGITUDE (West)			REPORT DATE		
	°	′		°	′		DAY	MO	YR
HALL DAM	40	55	7	074	22	6	05	JUL	78

[14]

NAME OF IMPOUNDMENT
LAKE VALHALLA

[18] [19] [20]

NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST. FROM DAM (mi)	POPULATION
MONTVILLE	1	13800

[24] [25] [26] [27] [27A] [27B] [27C] [27D] [27E] [27F]

	STRUCTURAL HEIGHT (ft)	HYDRAULIC HEIGHT (ft)	IMPOUNDING CAPACITIES MAXIMUM (acre - ft.)	IMPOUNDING CAPACITIES NORMAL (acre - ft.)	CORPS ENGR. DIST.	OWN.	FED. R.	PRV/FED	SCS A.	VERIFICATION DATE DA	VERIFICATION DATE MO	VERIFICATION DATE YR	BLANK
	19	19	725	500						05	JUL	78	

[28]

REMARKS

REMARKS
MATED

GENERAL INSTRUCTIONS

is form is for use in preparing the inventory of dams in the United States under the requirements of the National Program for e Inspection of Dams, P.L. 92-367. All items of Part I and Part II (Lines 0-9) must be completed as instructed below. Print mes distinctly in ink or pencil. For letters o, z, and i, write Ø, Z , and I.

ite only one letter or numeral in each space; do not use more letters than blocks allowed for an item. Do not abbreviate on rt I. Leave one space between words and no space between code letters.

or all letter codes or word entries place first letters in left block of field. In word fields any alphabetic, numeric or special aracter may be entered. For all numerical entries, use only numerals placing the last digit of number in the right block of eld, including trailing zeros. Do not include a decimal point! In fields where decimals are required values are to be placed around e decimal point printed on the form.

eave blank those spaces where item does not apply, e.g., do not write "N/A", "-", "None", etc., unless instructed to do so by ecific instructions. Use the remarks line when additional space is needed for an item, or to clarify an entry. Preface each remark ith the item number. (See Item ‖28‖ or ‖56‖ instructions)

PART I

em 1.1 ‖IDENTITY‖: The Division Engineer will assign and control the identity for dams in the states for which he is responble. The first two characters of the identity will be the two-letter state abbreviation in accordance with Federal Information rocessing Standards Publication, June 15, 1970 (FIPS PUB 6-1). In cases where a dam is physically located in two or more ates, one state will be designated as the principal state for the identity. The last five (5) characters of the identity will be a equential number assigned to identify dams within a state.

LINE 0:

tem ‖ 2‖ DIVISION: Enter the three (3) letter office symbol for the division making the report in accordance with ABBR Report Code, Appendix B, ER 18-2-1, Civil Works Information System; e.g., NAD, ORD, SWD, etc.

ocation:

tem ‖ 3‖ STATE: Enter two (2) letter principal state abbreviation in accordance with FIPS PUB 6-1.
tem ‖ 4‖ COUNTY: Enter three (3) digit county identification in accordance with FIPS PUB 6-1.
tem ‖ 5‖ CONG DIST: Enter one (1) or two (2) digit number for congressional districts in which dam is located.
tem ‖ 6‖, ‖ 7‖, and ‖ 8‖ (Use second location for structures situated in more than one state.)

Item ‖ 9‖ DAM NAME: Enter official name of dam. Do not abbreviate unless the abbreviation is a part of the official name. For dams that do not have a name, create a name by combining the two (2) letter state abbreviation plus "NO NAME" plus a sequential number, e.g., if two dams in the State of Alabama do not have names, they would be named as ALNONAME 1 and ALNONAME 2.
Item ‖10‖ & ‖11‖ LATITUDE AND LONGITUDE: Enter the latitude and longitude in degrees, minutes and tenths of a minute. All geographical location items pertain to dam as its maximum section.
Item ‖12‖ REPORT DATE: Enter the one (1) or two (2) digits for day, the first three (3) letters of the month and a two (2) digit year (e.g., 12 JAN74) in which the data has been revised, updated or otherwise changed.

LINE 1:

Item ‖13‖ POPULAR NAME OF DAM: If (other than the official name of the dam) in common use, enter the name in this space. Leave blank if not applicable.
Item ‖14‖ NAME OF IMPOUNDMENT: Enter official name of lake or reservoir. Leave blank if reservoir does not have a name.

Item ‖15‖ & ‖16‖ REGI
ER 18-2-1, Civil Works In
Item ‖17‖ RIVER OR ST
indicate as tributary to ri
Item ‖18‖ NEAREST DO
which can be located on a
Item ‖19‖ DISTANCE F
Item ‖20‖ POPULATION

Item ‖21‖ TYPE OF DA

EARTH - RE
ROCKFILL - ER
GRAVITY PG

Item ‖22‖ YEAR COMPL
year can be determined, u
Item ‖23‖ PURPOSES:
should indicate the relati

IRRIGATION I
HYDROELECTRIC - H
FLOOD CONTROL - C

Item ‖24‖ STRUCTURA
vertical distance from the
Item ‖25‖ HYDRAULIC
height of the dam with re
at the downstream toe of
side limit of the barrier t

Impounding Capabilities:

Item ‖26‖ MAXIMUM:
the maximum attainable
Item ‖27‖ NORMAL: E
normal retention level, i

Item ‖27A‖ CORPS OF
the dam is geographicall
SWF, etc.
Item ‖27B‖ OWNERSH
Corps of Engineers.
Item ‖27C‖ FEDERAL
Item ‖27D‖ PRIVATE
Item ‖27E‖ ASSISTAN
cial Assistance; B for Bo
Item ‖27F‖ VERIFICA

Item ‖28‖ REMARKS:
IN 1928, 23-SETTLIN

LINE 2:

Item [15] & [16] REGION AND BASIN: Enter two (2) digit numbers for Region and Basin in accordance with Appendix C, ER 18-2-1, Civil Works Information System.
Item [17] RIVER OR STREAM: Enter official name of river or stream on which the dam is built. If stream is without name, indicate as tributary to river named, e.g., TR-COLORADO. If off stream, enter name of river plus "OFFSTREAM".
Item [18] NEAREST DOWNSTREAM CITY-TOWN-VILLAGE: Enter the nearest downstream city-town-village of such size which can be located on a general map.
Item [19] DISTANCE FROM DAM: Enter distance from dam to nearest downstream city-town-village to the nearest mile.
Item [20] POPULATION: Enter population of city-town-village given in Item [18]

LINE 3:

Item [21] TYPE OF DAM: Enter two (2) letter codes, in any order, to describe type of dam.

EARTH - RE	BUTTRESS - CB	OTHER - OT
ROCKFILL - LR	ARCH - VA	(Describe "other" in remarks)
GRAVITY PG	MULTI-ARCH - MV	

Item [22] YEAR COMPLETED: Enter year when the main dam structure was completed and ready for use. If only approximate year can be determined, note this in remarks.
Item [23] PURPOSES: Enter one (1) letter codes that describe the purposes for which the reservoir is used. The order entered should indicate the relative decreasing importance of the project purposes.

IRRIGATION I	NAVIGATION - N	STOCK OR SMALL FARM POND - P
HYDROELECTRIC - H	WATER SUPPLY - S	DEBRIS CONTROL - D
FLOOD CONTROL - C	RECREATION - R	OTHER - O
		(Describe "other" in remarks)

Item [24] STRUCTURAL HEIGHT: Enter, to the nearest foot, the structural height of the dam which is defined as; the overall vertical distance from the lowest point of foundation surface to the top of the dam.
Item [25] HYDRAULIC HEIGHT: Enter, to the nearest foot, the hydraulic height of the dam which is defined as; the effective height of the dam with respect to the maximum storage capacity, measured from the natural bed of the stream or watercourse at the downstream toe of the barrier, or if it is not across a stream or watercourse, the height from the lowest elevation of the outside limit of the barrier to the maximum storage elevation.

Impounding Capabilities:

Item [26] MAXIMUM: Enter the acre feet for maximum storage which is defined as; the total storage space in a reservoir below the maximum attainable water surface elevation, including any surcharge storage.
Item [27] NORMAL: Enter the acre feet for normal storage which is defined as; the total storage space in a reservoir below the normal retention level, including dead and inactive storage and excluding any flood control or surcharge storage.

Item [27A] CORPS OF ENGINEERS DISTRICT: Enter the three character Corps of Engineers ABBR report code in which the dam is geographically located, in accordance with Appendix B, ER 19-2-1, Civil Works Information System, e.g., NAN, ORH, SWF, etc.
Item [27B] OWNERSHIP: Enter N, for Non-Federal; G, for Federal Gov't. Agencies other than the Corps of Engineers; C for Corps of Engineers.
Item [27C] FEDERALLY REGULATED: Enter N for No; Enter Y for Yes.
Item [27D] PRIVATE DAMS ON FEDERAL LAND: Enter N for No; Enter Y for Yes.
Item [27E] ASSISTANCE BY SOIL CONSERVATION SERVICE: Enter N for None; T for Technical Assistance; F for Financial Assistance; B for Both Technical and Financial Assistance.
Item [27F] VERIFICATION: Date the data was verified as being complete and correct. Enter date as described in Item [12]

LINE 4:

Item [28] REMARKS: Preface remarks with the item number to which it pertains, e.g., 22-ORIGINALLY CONSTRUCTED IN 1928, 23-SETTLING

PART II – INVENTORY OF DAMS IN THE UNITED STATES
(PURSUANT TO PUBLIC LAW 92–367)

See reverse side for instructions.

/

[29] [30] [31] [32] [33] [34] [35] [36] [37] [38]

STATISTICS

D SHAZ	CREST LENGTH (ft)	SPILLWAY TYPE	SPILLWAY WIDTH (ft)	SPILLWAY MAXIMUM DISCHARGE (cfs)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NO.	LENG (ft)
1	670	U	71	650	2000				

[46] [47]

MISC DATA

OWNER	ENGINEERING BY
VALHALLA LAKE CLUB	

[49] [50]

MISC. DATA (Continued)

REGULATORY AGENCY – DESIGN	REGULATORY AGENCY – CONSTRUCTION	REGULATORY AGENCY
NJ DEP	NJ DEP	NJ DEP

[53] [54]

MISC. DATA Continued)

INSPECTION BY	INSPECTION DATE DAY	MO	YR	
LANGAN ENGINEERING ASSOCIATES INC				PL

[56]

REMARKS

REMARKS

ENG FORM 1 DEC 77 4474A

[1]

OF DAMS IN THE UNITED STATES
TO PUBLIC LAW 92-367)

side for instructions.

STATE	IDENTITY NUMBER
1 2	3 4 5 6 7
N J	0 0 3 3 1 0

[34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45]

NAME OF DAM (CY)	POWER CAPACITY			NAVIGATION LOCKS								BLANK
	INSTALLED (MW)	PROPOSED (MW)	DIKE	LENGTH (ft)	WIDTH (ft)	LENGTH (ft)	WIDTH (ft)	LENGTH (ft)	WIDTH (ft)	LENGTH (ft)	WIDTH (ft)	
29 30 31 32 33 34	35 36 37 38 39 40	41 42 43 44 45 46	47	48 49 50 51	52 53 54 55	56 57 58 59 60 61	62 63 64 65 66 67 68	69 70 71 72	73 74 75	76 77 78 79		
2000												

[47] [48]

	ENGINEERING BY	CONSTRUCTION BY
29 30 31	32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55	56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79

[50] [51] [52]

REGULATORY AGENCY

CONSTRUCTION	OPERATION	MAINTENANCE
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43	44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61	62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
DEP	NJ DEP	NJ DEP

[54] [55]

	INSPECTION DATE			AUTHORITY FOR INSPECTION
	DAY	MO	YR	
29 30 31 32 33 34 35 36 37 38 39 40	41 42 43	44 45 46	47	48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
OF IATES INC				PL 92367

[56]

REMARKS

29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79

PART II:

Item [1] IDENTITY: Enter Identity per GENERAL INSTRUCTIONS on PART I.

LINE 5:

Item [29] D/S HAZ: Enter the digit that most closely represents the hazard potential that could occur to the downstream (D/S) area resulting from failure or mis-operation of the dam or facilities.

HAZARD POTENTIAL

CATEGORY	LOSS OF LIFE (Extent of Development)	ECONOMIC LOSS (Extent of Development)
3 = Low	None expected (No permanent structures for human habitation)	Minimal (Undeveloped to occasional structures or agriculture)
2 = Significant	Few (No urban developments and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry or structures)
1 = High	More than few	Excessive (Extensive community, industry or agriculture)

Item [30] CREST LENGTH: Enter, to the nearest foot, the crest length of the dam which is defined as: the total horizontal distance measured along the axis at the elevation of the top of dam between abutments or ends of dam. Note that this includes spillway width, powerhouse sections, and navigation locks where they form a continuous part of the dam water retaining structure. Detached spillways, locks, and powerhouses shall not be included.

Spillway:

Item [31] TYPE: Enter the one letter code that applies.

CONTROLLED = C UNCONTROLLED = U NONE = N

Item [32] WIDTH: Enter to the nearest foot, the width of the spillway available for discharge when the reservoir is at its maximum designed water surface elevation.
Item [33] MAXIMUM DISCHARGE: Enter the number of cubic feet per second which the spillway is capable of discharging when the reservoir is at its maximum designed water surface elevation.

Volume of Dam:

Item [34] VOLUME OF DAM: Enter the total number of cubic yards occupied by the materials used in the dam structure. If volume of separate materials is known, enter in remarks. Include portions of powerhouses, locks and spillways only if integral with the dam and required for structural stability.

Power Capacity:

Item [35] INSTALLED: Enter installed capacity to one tenth (1/10) Megawatt as of the report date.
Item [36] PROPOSED: Enter the future additional capacity proposed to one tenth (1/10) Megawatt.

Navigation Locks:

Item [37] NUMBER: En

Item [38] LENGTH: En

Item [39] WIDTH: Ente

Item [40] thru [45] Ente

Item [46] OWNER: Ente
Item [47] ENGINEERIN
Item [48] CONSTRUCTI
viate as required.

Regulatory Agency:

Item [49] DESIGN: Ente
design of the dam. If no o
indicate NONE.
Item [50] CONSTRUCTI
tion responsibilities over t
tion responsibilities over t
Item [51] OPERATION:
control, or surveillance res
authority, operational con
Item [52] MAINTENAN
tion or surveillance respon
authority or inspection or

Inspection:

Item [53] BY: Enter the
inspection has been perfor
Item [54] DATE: Enter
when the inspection was p
Item [55] AUTHORITY
cated in Item [53], e.g.,

Item [56] REMARKS:
e.y earthfill. Only one Re

Navigation Locks:

Item [37] NUMBER: Enter the number of existing navigation locks for the project.

Item [38] LENGTH: Enter to the nearest foot the length of the navigation lock.

Item [39] WIDTH: Enter to the nearest foot the width of the navigation lock.

Item [40] thru [45] Enter the lengths and widths of additional locks.

LINE 6:

Item [46] OWNER: Enter name of owner. Abbreviate as necessary.
Item [47] ENGINEERING BY: Enter name of organization that engineered the main dam structure. Abbreviate as required.
Item [48] CONSTRUCTION BY: Enter name of construction agency responsible for construction of main structure. Abbreviate as required.

LINE 7:

Regulatory Agency:

Item [49] DESIGN: Enter the name of the organization other than the owner having regulatory or approval authority over the design of the dam. If no organization other than the owner has regulatory or approval authority over the design of the dam indicate NONE.
Item [50] CONSTRUCTION: Enter the name of the organization other than the owner having regulatory authority or inspection responsibilities over the construction of the dam. If no organization other than the owner has regulatory authority or inspection responsibilities over the construction of the dam indicate NONE.
Item [51] OPERATION: Enter the name of the organization other than the owner having regulatory authority, operational control, or surveillance responsibilities over the operation of the dam. If no organization other than the owner has regulatory authority, operational control or surveillance responsibilities over the operation of the dam indicate NONE.
Item [52] MAINTENANCE: Enter the name of the organization other than the owner having regulatory authority or inspection or surveillance responsibilities over the maintenance of the dam. If no organization other than the owner has regul authority or inspection or surveillance responsibilities over the maintenance of the dam indicate NONE.

LINE 8:

Inspection:

Item [53] BY: Enter the name of the organization that performed the last safety inspection. Abbreviate as required. If no inspection has been performed enter NONE.
Item [54] DATE: Enter the one (1) or two (2) digits for day, the first three (3) letters of the month and a two (2) digit year when the inspection was performed. If not applicable, leave blank.
Item [55] AUTHORITY FOR INSPECTION: Enter the legislative or regulatory authority for performing the inspection indicated in Item [53], e.g., P.L. 92-367; Div 3, Water Code, State of Calif; ER 1110-2-100; etc.

LINE 9:

Item [56] REMARKS: Preface remarks with the item number to which it pertains. e.g., 34, 500,000 c.y. conc. 475,000 c.y. earthfill. Only one Remarks line should be used for PART II remarks.

APPENDIX 6

REFERENCES

VALHALLA LAKE DAM

APPENDIX 6

REFERENCES

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13. Wolfe, P.E., 1977, The Geology and Landscapes of New Jersey, Crane, Russak & Company, Inc., New York, New York, 351 pp.